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RICHARD P. ROTHWELL, C.E., M.E.,
ROSSITER W. RAYMOND, Ph.D.,
CHARLES KIRCHHOFF, Jr., M.E., } Editors.

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Communications for Mr. RAYMOND should be addressed to ROSSITER W. RAYMOND P.O. Box 1465, New York. Articles written by Mr. RAYMOND will be signed thus * ; and only for articles so signed is he responsible.

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WE print elsewhere the conclusion of our abstract of M. E. CUMENGE'S report on the Rio Tinto mine, which we believe leaves no doubt as to the future of that great enterprise. It is destined to play an increasingly important part in the copper trade of the world. The preparations for an increase in the output are on a magnificent scale, and the improvements introduced in the metallurgical treatment of the ores dispel all hope that in the long run any falling off in the world's supplies of copper, from the residues of burning pyrites in acid works, will not be fully compensated by an increased make on the spot, without reference to the revenue derived from the sulphur.

SCIENCE and the arts have lost in Sir CHARLES WILLIAM SIEMENS, who died suddenly of rupture of the heart, one of their leading workers. Dr. SIEMENS was one of the very few who have been able to make original contributions to science while engaged as leaders of progress in conducting large business enterprises in more than one branch of technology. As an inventor, a metallurgist, an engineer, and an electrician, his achievements are numerous and varied. One of eight sons of a family in moderate circumstances, he was born at Leuthe, Hanover, and after a course of studies at a polytechnic school and a university, he began work at the Stolberg engine-shops in 1842, at the age of nineteen. A year later, he for the first time visited England, which was to become his future home. He brought forward a series of inventions, in some of which he had the co-operation of his brother WERNER, and it was not until 1847 that he turned his attention to the study of the dynamical theory of heat, which ten years later led to the development of the regenerative system of firing with which his name and that of his brother FREDERICK are so closely associated. A little later, he took up the manufacture of iron directly from the ore, a process which has not, however, fulfilled the expectations of himself and his friends. In 1848, he turned his attention to electric and telegraph engineering, in which he was highly successful. England, his adopted country, delighted in showering honors upon him, while his brief sojourn in this country years ago won for him many friends.

IN a recent issue, we printed an interesting letter from Mr. W. W. SCRANTON, President of the Scranton Steel-Works, on the working of the Gjers soaking-pit at that establishment. Mr. JOHN GJERS, of Middlesborough, quotes it in a letter printed in a number of English technical journals, in which he gives some data on the rapid spread of the process in Europe. In Great Britain, the Darlington Steel Company, which was, we believe, among the first to take up the process, has rolled 60,000 tons of ingots into blooms from the pits. The West Cumberland Steel Company, also, has been blooming from the pits, while the Mossbay Iron and Steel Company is getting ready to roll rails directly. The first open-hearth works to adopt the process is the Steel Company of Scotland, which will use it in its plate-mill. On the continent, the Société Cockerill is blooming 96 per cent of its make from the pits ; while in France, the DE WENDELS are preparing for its introduction. In Austria, at the works of which M. KUPELWIESER, the well-known metallurgist, has charge, soft steel ingots for plates have been put through the pits to be rolled into slabs without heating, and a new rail-mill now building is also equipped with a pit plant. An interesting statement is made by M. GREINER, who, as the result of experiments made, has found that the waste in rolling from ingot to bloom is reduced to one half of one per cent, while in rolling directly to the rail it is only one per cent, a gain in the latter case of at least two per cent. That the advantages of the soaking-pit are becoming appreciated in this country may be gathered from the fact that the Cambria and the Edgar Thomson works are about to introduce it. It may be stated that Mr. GJERS, with the object of preventing the cooling of the top of the ingots, has designed a cover, and that he has undertaken improvements the object of which is to facilitate repairs.

LEAD has dropped down to 3·70 cents per pound, under fairly large sales. An encouraging feature is the appearance of the first evidences of a speculative support of the metal, but otherwise the general feeling in this the leading market of the country is one of discouragement. The most enthusiastic, a small number in any case, do not look forward to an early improvement, but limit their hopes to maintenance of current rates. The mines have now to choose between two alternatives, either to close down or to make some effort to reduce the cost of delivery of lead to the markets of the country. The former course is one which few will care to adopt, unless special circumstances, like the fight between the Silver Cord at Leadville and the smelters, prove an inducement. An idle mine costs money, and very few of them are in a position to make immediate outlays with the hope of future compensation from higher prices. Most of the mines will therefore probably go on producing as long as they can make both ends meet, or can raise money. Their principal relief, in the mean time, must therefore come from some other quarter. They have a right to demand, and will probably urge, that others who have in the past largely profited from the industry in which they represent first hands shall also bear their share of the burden. The smelters, we know, have been sailing as close to the wind as is possible. Where the prospect of cheapening lies is in the railroad rates, which, as we have already stated, appear to show much that is mysterious. We can see no sound reason why a mining company, when it ships ore from Leadville to Denver, should pay $5 per ton, while if a smelter ships it, it should be little more than one half of that amount. The nominal rates from Leadville to Pueblo or Denver are $12 per ton for bullion, and $10 from Denver to Kansas City ; but how much cutting there is under these figures it is difficult to get at, and yet the profit must be great when compared with the rate from Kansas City to St. Louis, which is only $2.80 per ton. Nobody will demand that the railroads haul base bullion for bare cost or even less, but the impression is general that they might accept much lower rates than those rumored to be paid by "insiders." If the refiners gave the benefit of the reduction to the smelters, and they in turn were to ease up on smelting charges, the miners could meet current prices of lead.

IT is satisfactory to note that a ray of hope has been cast upon at least one important industry, the pig-iron manufacture, by the elaborate statistics just published by Mr. JAMES M. SWANK, Secretary of the American Iron and Steel Association. The following table will show at a glance to what an extent production has accommodated itself to the great shrinkage in current demand, and it is only necessary to add that of all branches of the iron trade the blast-furnaces are the slowest to so adapt themselves. It costs a good deal of money to blow out a furnace and blow it in again, and the temptation to keep on working is increased by the fact that pig-iron, more than any other product, is a staple article, there being no consideration as to assortment, etc. A rolling-mill can be shut down in a day and be started at short notice, and can not so easily pile up stock.

CONDITION OF THE BLAST-FURNACES.

Kind of fuel.	In blast Jan. 1.	In blast July 1.	In blast Nov. 1.	Going in Nov.	Going out Nov.	Out of blast Nov. 1.
Anthracite	161	125	117	3	3	104
Charcoal	129	98	98	7	6	144
Bituminous	127	111	116	9	6	107
Total	417	334	331	19	15	355

The great decrease is in the anthracite furnaces, of which 44 have blown out since the beginning of the year. The furnaces using bituminous coal or coke as a fuel have decreased in the number working very slightly, only eight, taking into account those noted as preparing to blow in this month. The decrease with them will, we presume, become more marked when some of the rail-mills still running on orders stop.

The same state of affairs is reported, fortunately, by the quantity of stock, and the showing is more satisfactory now than it was a few months ago, when it was found that the stocks had increased from 383,655 tons on January 1st to 528,590 tons on July 1st. Since then, the figures have changed as follows:

STOCKS OF PIG-IRON IN MAKERS' AND AGENTS' HANDS—GROSS TONS.

	July 1.	Nov. 1.
Bituminous	196,699	128,830
Anthracite	186,735	158,521
Charcoal	145,756	145,003
	528,590	432,354

When it is considered that consumers have run down their supplies notoriously low during the long period of hand-to-mouth buying, it will be conceded that the trade is getting down to "bed-rock." It would be idle to deny that there is not much prospect of a sustained improvement during the winter months, which are generally dull; but there is every assurance that the business is now in a very sound position statistically, and that the first signs of returning activity may witness a reaction which, under the conditions, is likely to be rapid and well sustained.

CORRESPONDENCE.

[Communications will be noticed only when accompanied with the full name and address of the writer. Unless specially desired, only initials will be printed. We invite criticism and comment by the readers of the ENGINEERING AND MINING JOURNAL. Replies not intended for publication should be addressed to the Editor of the ENGINEERING AND MINING JOURNAL in blank, stamped, and sealed envelopes. We do not hold ourselves responsible for the opinions of our correspondents.]

Mill Statistics.

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: It is encouraging to find in the last number of the JOURNAL (p. 309) a plea by Mr. Stetefeldt for more complete and accurate statistics of metallurgical work, especially in our mills for extracting the precious metals. That there is room for great improvement there can be no question, but we can scarcely expect perfect work in a perfect system within the bounds of the cost which mining and milling companies are willing to assume. The excellence of such work must long continue to be relative and not absolute in most of our mills; for very few companies are willing to pay expert chemists and assayers, and to sustain a proper laboratory in which accurate work can be executed. The results obtained by the assays and tests are generally approximations, and must be so received.

Mr. Stetefeldt's criticism of my commendation of the statistical tables of the Alice mill in 1881 is just to a certain extent. To me, the statistics were worthy of commendation because so much more full and complete than we usually find. Mr. Stetefeldt looks for the defects, which unquestionably exist; but the *effort* of the management was in the right direction.

In regard to the fact that the product was greater than the assays indicated, and my suggestion in explanation of it, it should be said here that the last paragraph of the sentence quoted from my report contains a typographical error; the word "experienced" should be "explained," and the sentence should read, "*It is not yet clearly explained, but is a well-ascertained fact, that the product overruns the assays.*" Experienced is the wrong word. The fault most likely lay in taking the samples; the full quantity not being represented in the assays. W. P. BLAKE.

NEW HAVEN, CONN., Nov. 22.

A Request for Specimens of Construction Material for Compression Tests

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: For some years past, I have been making investigations on metals and alloys of all kinds, and have arrived at a point where I am very anxious to secure specimens for the purpose of studying the effects of compression. Will you be good enough to announce the fact through your JOURNAL, and ask the manufacturers of metals and alloys of any kind to send me specimens for that purpose? The specimens I wish should be of the following dimensions: For each investigation of compression, two inches in diameter and three inches long, three pieces being required for each examination; two pieces each one inch in diameter and four inches long; and from one to five pounds of the same metal or alloy for each examination. I should like to make at least three examinations, which will make fifteen pieces in all of each metal—nine of the larger size, six of the smaller, and not less than five pounds of the filings. I desire as much material as possible, as the expense of these investigations will be very great, and as I am making them for scientific purposes only, without remuneration of any kind, in the hope of discovering some facts which will be useful to manufacturers. I shall also be very glad to make comparative tests other than compression, and also analyses of the metals and alloys for their actual cost to me, making no charge for my own time and services.

The results I have already obtained are such as lead me to believe that the results of the investigations I am about to make will be of great interest to all persons using metals of any kind for construction.

A few very liberal gentlemen and firms have supplied me with the amount necessary for the investigations on compression; but I have no funds with which to make the comparative tests on tension, and on torsional and transverse strain, and I am therefore willing to make them for their actual cost to me, and request your kind interest in making my purpose known to your readers and asking their assistance. Yours truly,

NEW YORK, Nov. 16. THOMAS EGLESTON

Is Alumina an Acid or a Base in Singulo-Silicates?

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: I was much interested in a few suggestions made by Mr. Henry M. Howe in the JOURNAL of November 17th, and from having been professionally associated with him in metallurgical work, realize that any statements made by him are entitled to respect. But I desire merely to say a few words in confirmation of a suggestion that he throws out, and that my own experience substantiates to a considerable extent, although the question of exactly what *rôle* alumina plays in the formation of slags is far too deep and complicated to be definitely settled by any single series of observations.

During the years 1872 and 1873, I was engaged in smelting the ores of Mount Lincoln (Colorado) and vicinity in a blast-furnace. They were largely composed of massive heavy-spar, with some lime and silica, though with too much lead and copper to answer for amalgamation, while, on the other hand, the overwhelming percentage of baryta and lime, and the almost total lack of iron, made their smelting, with the poor charcoal at our command, a matter of the greatest difficulty. They were smelted into a copper matte, running some 700 ounces in silver and 25 per cent copper, and as, owing to the high percentage of heavy-spar, the matte often fell below this grade, it was frequently found necessary to calcine and resmelt it with pure siliceous ores, to bring it up to the proper grade for shipment, or for home treatment, by a modification of Patera's method, which I carried out toward the last, and while the Moose mine was in its glory. These brief explanations being necessary to show the quality of ore we had to deal with, I will come to the point suggested by Mr. Howe. He asks, "May it not be that, in calcareous singulo-silicates low in iron, alumina acts as an acid, while in ferruginous ones low in lime, it acts as a base?" My experience confirms this entire suggestion, as will be seen. I have assumed that baryta may be regarded as replacing lime to a great extent, and without going into accurate figures, my old smelting records not being at hand, I can distinctly affirm that, when producing a slag high in lime (and baryta) and low in iron, with only about 24 per cent of silica, an addition of a highly aluminous ore, carrying very little silica, produced almost the same effect as the addition of an equivalent amount of nearly pure quartz. This was first discovered by one of those fortunate accidents that often do more toward rendering a doubtful enterprise successful than the most carefully laid plans. For some weeks, we had been running with the very basic slag mentioned above, which gave us a great deal of trouble, being so pasty that it only flowed with difficulty, and constantly carried out grains of matte, requiring to be resmelted in considerable proportions. I could easily remedy it by the addition of silica, but having no siliceous ores at my disposal, excepting some that carried a large amount of heavy-spar, I found it unprofitable to add a sufficient amount of barren quartz to obtain such a slag as I desired. In this dilemma, I purchased a few tons of ore of a very peculiar nature from Buckskin Gulch. Analysis showed it to consist largely of alumina, with some silica, of course, and it carried about 90 ounces of silver to the ton as sulphide of silver, scattered through it in little specks and nodules. I regarded it as an ore only fit for amalgamation, and yet apprehended considerable difficulty even by that method, owing to its clayey nature. Yielding to the solicitations of my head smelter, as ignorant a man as ever lived, though a good smelter, and who fancied the ore would make a good flux because he had once used some clay iron ore that looked like it, we began its use cautiously, and with the most excellent results. Not to make too long a story of it, I will merely add that we contracted for a large quantity of the ore, and soon came to regard it as our stand-by for all ores carrying too high a percentage of lime and baryta. So much for alumina as an acid in slags high in lime and low in iron.

As time went on, several gold mines were opened in Montgomery, Mosquito, and the neighboring districts; and instead of being short of siliceous material, we were crowded with it, as these gold ores were mostly surface quartz, from which all the pyrites had long since disappeared, and though well stained with iron oxide, carried over 90 per cent of silica. They would have been best treated in a stamp-mill, but there being none running in the district at that time, there was no market for them except at the smelting-works, and as we could purchase them pretty much at our own price, and many of them contained from two to four ounces of gold per ton, we soon were overstocked with them. It so happened that, at the end of our autumn campaign, I had smelted up all our stock of Moose and other heavy-spar ores, and had on hand merely a quantity of the siliceous gold ores, and a lot of calcined matte, with which I proposed to smelt through as much of these gold ores as possible. On calculating out my slag, I despaired of nearly finishing up my gold ores; but my smelting foreman, having a natural desire to see every

thing cleaned up neatly, and recognizing the impossibility of fluxing the large pile of quartz with our little remnant of calcined matte, reasoned that our clay ore, of which we could always obtain a sufficiency at short notice (though much lower grade than I at first described), being such an admirable flux at one time, ought to be equally good under all circumstances; and taking advantage of my absence and the temporary delegation of my authority to him, proceeded to carry out this exceedingly simple and ingenious theory, and curiously enough, with such satisfactory results that a large heap of almost pure quartz was smelted with the addition of a very little iron, and a considerable proportion of alumina, the slag being perfectly clean, but more like glass than any blast-furnace slag that I ever saw before or since. I think this gives us a right to speak of alumina as a decided base. I fully recognize the impropriety of attaching any weight to such a very rambling statement, unsupported by analyses or exact figures. But both analyses and exact figures were made at the time, and are now among my possessions, and I merely have stated the very strong impression made on my mind by my investigations at that time.

I need hardly say that my smelting foreman regarded the laboratory work with the utmost contempt, and considered (and very justly, as it happened this time) that he could judge by eye what flux was needed better than the "boss" could with all his laboratory work, although I fear that, if I had taken up his offer to smelt any thing, even fire-brick, as he insisted he could do in his excitement, if he "only had enough of that Buckskin clay for a flux," he might not have been so uniformly successful.

I trust Mr. Howe may feel gratified at having arrived at the same results by a course of reasoning. EDWARD D. PETERS, JR., M.E.

ANSONIA, CONN., Nov. 1.

Is Alumina an Acid or a Base?

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: In the last number of the JOURNAL, Mr. H. M. Howe asks, "Is alumina an acid or a base in singulo-silicates?" and requests more information on this point.

Perhaps the behavior of the slags obtained in smelting the franklinite residuum for spiegel may be of help. The slag is normally of about the following composition: SiO_2, 34·5 per cent; Al_2O_3, 9·5 per cent; MnO, 12·5 per cent; FeO, 2·5 per cent; CaO, 32 per cent; MgO, 9 per cent; being nearly a singulo-silicate, if the alumina is present as a base. Any increase of either silica or alumina causes the slag to appear and act as if it were more acid and to take up more manganese. In fact, I am more afraid of the effect of an excess of alumina on the grade of the iron than of an excess of silica.

I know of one spiegel furnace using similar residuum where, when a very poor coal was used (I was told it contained 27 per cent ash) the slag contained about 30 per cent of silica and 15 per cent of alumina, and the furnace made gray iron containing about 8 per cent of manganese. On drawing the charge so as to get a slag of about the composition I have given above, it made 15 per cent spiegel. The same effect (lowering the grade) would have been produced if the slag had contained a normal quantity of alumina and an excess of silica.

These slags being made in larger and hotter furnaces than is usual with slags so basic and so high in oxides of the iron group, may aid in forming a more general conclusion than if lead slags only were considered. My own opinion is that, where silica is high and alumina is low, the alumina acts as a base; but where silica is low and alumina is high, it acts as an acid; in other words, the alumina has a tendency to form a slag of about the same acidity, and plays whichever part is necessary to effect this result. Yours truly, GEORGE C. STONE.

NEWARK, N. J., Nov. 19.

O Wise and Just Reporter!

EDITOR ENGINEERING AND MINING JOURNAL:

SIR: The following incident will be interesting and a warning to the profession. A few weeks ago, a gentleman called at my office, introducing himself as a reporter for a paper which we will call the *Weekly Scientific Terror*. He stated that he had noticed the issue of a patent, granted to me for a new metallurgical process, and wished to publish an account of it in his paper. Would I give him the necessary information? I assured him I would take great pleasure in doing so, and gave him a concise description of my "improved process for treating sulphides, obtained in the lixiviation process with sodium hyposulphite," which he took down by "short-hand." About a week later, a reporter No. 2, from the *Weekly Scientific Terror*, handed to me a voluminous manuscript for "correction." It was headed: "*The Treatment of Ores—A New Patent just taken out by a well-known Mining Engineer.*" The article commenced with a most favorable notice of my professional achievements; noticed "an able paper read before the American Institute of Mining Engineers;" and finally came to the "last patent," to be especially considered. I felt so highly flattered by this kind and unsought-for attention that I actually blushed, and cried out: "O wise and just Reporter!" After giving the "claims" of the specification, the article ended as follows, namely: "Mr. Stetefeldt said yesterday to a reporter for this paper, in an interview at his office, that the lixiviation process was coming into general favor in place of amalgamation, and is now in use in important mills in Nevada and elsewhere. The old method was to roast the ores in a reverberatory furnace, and then to melt the orders and material" [this stands for "roasted material," I suppose] "in a crucible with scrap-iron, to obtain bullion together with a certain amount of matte containing copper and silver. There is a considerable loss in drying sulphides—sometimes as much as four per cent—whereas, by the lixiviation process, the sulphides do not need to be dried and roasted, and there is no chemical loss, but refined bullion is produced, and without any copper matte."

After reading this, I felt stunned. Did I say all this to you, O wise and just Reporter? I felt as if I was a sulphide after losing 4 per cent of silver by drying; indeed, I felt as if I had gone through the whole lixiviation process, and been turned out as copper matte. Reporter No. 2 then said: "Of course, you wish to have a few hundred copies (at 12 cents per copy) of the *Weekly Scientific Terror* with this article for distribution!" A quick calculation how many "Havanas" and how much "Liebotschaner" this would represent brought me back to my senses. I made some very unkind remarks about the scientific ability of the editorial staff of the *Weekly Scientific Terror*, and vehemently protested against taking several hundred copies of their valuable paper. Reporter No. 2 finally proposed that I should write an article myself, but not "too good;" otherwise, the readers of the paper would suspect that it had been written by the inventor himself. "Can you do it in a week?" "In half an hour," I said. "Well, then, I shall call for it on Friday morning." Friday morning came, but Reporter No. 2 did not! I am afraid I have hurt the feelings of the *Weekly Scientific Terror*.

NEW YORK, Nov. 19. C. A. STETEFELDT.

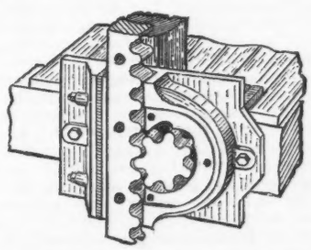
[Referring to the above, we may state that, during the past few months, four similar cases, all the doing of the *Scientific T.*, have come under our notice in this city and in Philadelphia. In one instance, the only one in which the operations of the schemers were successful—the victim being a manufacturer of straw goods, if we remember correctly—a gentleman came to ask our advice. In the rush of business, he had listened to the reporter of the *Scientific T.*, and had signed an order for a few hundred copies, without, as it occurred to him later, making any inquiry as to the cost per copy. He feared that an exorbitant charge might be made, and went off relieved after having received assurances of the doubtful legality of such a course. We need hardly add that, as a new venture in journalism, the *Scientific T.* does not deserve encouragement.—EDITOR ENGINEERING AND MINING JOURNAL.]

METALLURGY AND ENGINEERING AT THE BOSTON EXHIBITION.

Special Correspondence of the Engineering and Mining Journal.

(*Continued from page* 309.)

Canfield's Safety-Stop.—This simple and apparently very effective little stop shown in the cut, though designed for ordinary elevators, seems quite applicable, with certain modifications, to mine shafts. It consists of three parts: A stout rack strongly bolted to the guide-timbers, and having short but thick and wide teeth; a small but strong cast-iron guide-box, with a recess which is toothed on its upper side; and a pinion, wholly unpivoted and playing freely in the recess in the guide-box, and gearing into the teeth of the rack. These parts are shown in the accompanying cut, in which, however, the teeth on the upper side of the recess of the guide-box do not stand out very clearly. As the elevator rises and falls, the little pinion plays loosely in the recess, its teeth gearing into those of the rack, and barely avoiding contact with those of the guide-box, its own weight keeping it always against the bottom of the recess. But if the downward speed of the cage is rapidly increased, the little pinion becomes jammed between the teeth of the rack and those of the upper side of the recess, and the



cage is thus stopped instantly. The reason for this is evident. The pinion does not fall freely, its descent being retarded or hampered by its playing in the teeth of the rack: this retards its descent so much that any considerable increase in the downward speed of the elevator causes the guide-box to overtake the pinion, so that the latter now comes in contact with the upper and toothed sides of the recess. An advantage of this is, that it is apparently instantaneous. I carefully watched its action when the elevator rope was suddenly detached, and the car appeared to stop before it had fallen an inch and a half. Of course, much less strain is caused by stopping a car before it has fallen an inch than by stopping it after it has acquired momentum in falling a considerable distance. To prevent the stoppage being so sudden as to seriously strain the cage, rubber plates are introduced in the guide-box itself, and between the cage timbers and the flange of the guide-box which supports them.

One objection to the stop occurs to me. Its sudden action depends on there being but a small amount of play between the pinion and the inclosing recess. Now, in the years which might elapse before the breaking of a rope, and in which all care and concern for the safety-catch might have vanished, the teeth of the pinion might have become considerably shortened by their constant sliding friction against the bottom of the guide-box, which would itself be worn away by the same cause. This wearing away of these parts would destroy their adjustment, on the accuracy of which the rapidity of action of the catch seems largely to depend. Mr. Canfield states that he has tested this point, and it appears that the teeth wear into such a shape that they jam and stop the cage while they are still long enough to act promptly in case of breakage of the rope. Of course, these heavy iron racks would be too costly for deep shafts, and I have only described this stop because it occurs to me that it might be easily modified to suit wooden guides. If the pinion had sharp saw-teeth, and if the upper side of the recess which contains it were lined with wood or rubber, it should jam between this lining and the wooden guide on a sudden increase of the rate of descent of the cage, just as the present pinion does between the racks and the recess. It would cost but little to put two or even four such stops on each side of a cage in addition to any other safety-stop desired, which they would thus reinforce. They would be an anchor to leeward.

Emery-Wheel Flanges.—On account of the many and fatal accidents to metal workers from the bursting of emery wheels, Ware's anti-bursting flanges deserve attention. We are told that the number of persons thus injured averages as high as from eight to ten per annum, of whom nearly

fifty per cent are killed. To diminish the dangers from this source, Ware's emery-wheel flanges are made very broad, nearly as broad as the wheel they hold, and are studded over on their insides, that is, on the sides which come in contact with the emery-wheel itself, with rubber buttons, set very tightly into little recesses in the flanges, and projecting perhaps an eighth of an inch from their surface. These buttons grasp the emery-wheel very firmly when the flanges are screwed together tightly, so that when a wheel bursts the fragments can not fly out, being held in place by the rubber buttons. In some cases where wheels with these flanges have broken, the fracture has not been discovered until the wheel was stopped at the end of the shift. The Union Stone Company, which exhibits these safety-flanges, has also a swing-frame grinding and polishing machine, which consists in a swiftly-revolving emery-wheel suspended and freely swinging, its hight and position being readily and easily adjustable. It is especially designed for grinding large castings, etc., which it would be difficult or inconvenient to grind with the ordinary stationary wheels. It is hung from above with a jointed frame, and is swiftly revolved by an endless rope, whose stretch is compensated for by simple mechanism.

This company's surface-grinding machine also deserves attention. It is practically a small planer or milling-machine, in which the cutting is done by an emery-wheel instead of in the ordinary way. The piece to be operated on is fastened to a table, by jaws, etc., and the table travels back and forth beneath the emery-wheel, just as the bed of an ordinary planer does. This device might advantageously replace the planer and milling-machine in working exceedingly hard substances, such as the surfaces of dies and punches.

Messrs. Hill, Clarke & Co., of Boston, have an interesting display of *Iron-Working Machines*. Among those with features at once novel and interesting may be mentioned their large Brainerd milling-machines and their fine hollow spindle lathes, made by Flather & Co., of Nashua. These milling machines run from 9 to 84 inches, the latter size weighing only 7000 pounds. The large sizes are advantageously replacing planing-machines for some important classes of work. The Flather lathes, in addition to the hollow spindle, whose advantages are too well known to need description here, are fitted with most excellent turrets, which enormously increase the output of work. On some classes of work, for example, on bolts, etc., of different diameters in different parts of their length, five times as much work can be done in a given time with these turrets as with a lathe unprovided with them; and once set by a competent machinist, they can be run by a boy on work which would require the constant attention of a man if done in the ordinary way on a lathe.

The same firm displays the *Cummer Engine*, which I will pass over briefly, as it has already been fully described in your pages. It is an automatic cut-off engine, with a positive cut-off motion similar to that of the well-known Buckeye engine, as opposed to the releasing cut-off class like the Corliss. In the Buckeye, the governor consists of two weights revolving around the main shaft in a vertical plane. As the centrifugal force throws these weights outward, they draw with them the cut-off eccentric, altering its lead, so that the steam is cut off earlier in the stroke. In the Buckeye engine, the centrifugal tendency of these weights is resisted by a pair of springs. In the Cummer engine, it is resisted by a single spring assisted by a heavy stationary counterpoise, which is connected with the governing revolving weights by an arrangement of bell-cranks. By lessening the tension of the springs in the Buckeye governor, and by lightening the counterpoise in the Cummer engine, we diminish the centripetal force; that is, the resistance which is offered to the centrifugal tendency of the revolving weights for a given radius of gyration; so that at a given speed of revolution they will fly out farther from their shaft, and thus increase the lead of the cut-off eccentric, causing the steam to be cut off earlier and reducing the speed of the engine. That is to say, the speed at which the engine will run depends, in the Buckeye, on the adjustable tension of the governing springs—in the Cummer, on the adjustable weight of a counterpoise. While both are excellent engines in design as well as in workmanship, the Cummer seems to offer a slight advantage for certain classes of work in having the counterpoise which determines the speed of the engine accessible while it is running, so that the speed can be altered to any desired extent while it is in motion, even if at full speed; while in the Buckeye it is necessary to stop the engine in order to get at the springs whose tension controls its speed.

The *Westinghouse Engine*, which is also exhibited, has several features that especially commend it for mining purposes. The engine is a single-acting, double-cylinder, vertical one, all the moving parts being contained in a closed case, partly filled with oil, into which the cranks dip at each revolution, oiling themselves automatically. The cut-off is fixed, hence it is not adapted to work where the load varies considerably and where a high degree of efficiency is needed. While, therefore, it can not compete in efficiency with automatic cut-off engines, it is far more economical than the plain slide-valve engine, since it cuts off very much earlier than the latter can be made to do. For remote places, its lightness, compactness, simplicity, freedom from repairs, and the small amount of skill and care needed to run it properly, combined with its cheapness and very good efficiency, render it attractive. It is much lighter than most other engines per horse-power, and probably far lighter per horse-power than any engine which can compare with it in efficiency. It is extremely compact. There are only about one fourth as many points where wear can take place as in ordinary engines, and it is so designed that its good performance is quite independent of wear, since all wear or lost motion is taken up automatically. The wearing parts are not adjustable, and are not touched till worn out. There are no oil-cups, not a packed joint or a stuffing-box of any kind; not a brass that can be keyed up; it is so self-contained that it is independent of alignment. These features render it possible and, in many cases, advisable for economy's sake to employ unskilled men to run it. Its cost is from 20 to 40 per cent below that of the best automatic cut-off engines, and the makers are prepared to guarantee that these engines when of 100 horse-power or upward will run with three pounds of coal per indicated horse-power per hour—which is not so far below the guarantee of the most economical non-compounding engines. Its makers claim, apparently justly, that the consumption of oil is much less than in other engines. While the valves and pistons are lubricated by an ordinary oil-pump, the cranks and cylinders are automatically lubricated by the splashing of the oil in the internal crank-case, and there are no cross-heads or slides to oil. Its freedom from repairs is well illustrated by its having run in some cases eight months continuously without a stoppage, and without any adjustment whatsoever, not a key or a nut being touched.

The *Porter-Allen Engine* is also exhibited, running under a heavy load at 766 foot piston speed, with apparently perfect smoothness, not the slightest tremor being observable. The design of this engine is probably preferred by a greater number of the most intelligent engineers than that of any other engine, and, as long as its present very high standard of workmanship is kept up, it should yield the palm to no engine yet designed. It requires, however, the greatest care on the part of its makers and of those in charge of it.

Messrs. Kendall & Roberts, of Cambridgeport, Mass., exhibit a very compact double-cylinder *Mine Hoisting-Engine*, with conical drum, the whole design being excellent. They have here also an automatic cut-off engine which has been much admired.

Glass and Porcelain.—Here we find four exhibits which deserve special mention. The Trenton Pottery Company, Trenton, N. J., has a very creditable display. Ott & Brewer, of the same city, have a really most admirable display of very beautiful Belleek china, so-called from Belleek, in Ireland, where it was first made. It is very fine, and some of it seems as thin, delicate, and beautiful as the celebrated egg-shell china, the exterior designs being very clearly and distinctly visible from the inside of the pieces on holding them up to the light, so thin and transparent is it. The Vasa Murrhina Art Glass Company, of Sandwich, Mass., exhibits very beautiful Venetian glass vases and similar designs, the aventurine and other Venetian effects being charmingly reproduced. It is stated that this industry has only just been started here, employing American workmen almost exclusively. Even leaving out of consideration the drawbacks which necessarily attend the beginning of such an industry, these products deserve admiration. The New England Glass-Works, of East Cambridge, Mass., have a very beautiful display; the most striking feature of it being their amberina glass. This ware is largely made into vases and other long articles, which are of a beautiful ruby color at one end, shading off imperceptibly into a charming delicate amber color at the other, the shading being so gradual that it is as impossible to say where the red ends and the yellow begins as it is in general to point out where a hillside ends and where its valley begins. Although a patent has been taken out for making this beautiful glassware, the method and the chemical principles involved are kept secret. As far as can be gathered, the red color is due to the addition of gold and copper to the glass. The beautiful red tints produced in glass by both cupreous oxide and oxide of gold are well known, as is also the fact that gold-bearing glass when first prepared in certain ways is quite colorless until it has been brought a second time to a high temperature, when it assumes a beautiful ruby tint, supposed by some writers to be due to a partial reduction of the trioxide of gold which they suppose exists in the colorless glass. At East Cambridge, the glass is apparently brought to the desired shape, and the end it is desired to color red is then brought close to the glory-hole, from which it is withdrawn we may guess soon after that end has reached the temperature at which the ruby color of gold is produced, and before the color has had time to extend the whole length of the piece. It may be conjectured that the yellow color is due to the presence of metallic copper, as in aventurine glass, though more finely divided; that when the end of the piece is heated, the gold is reduced to ruby oxide, the oxygen which it parts with converting the metallic copper into cupreous oxide. H.

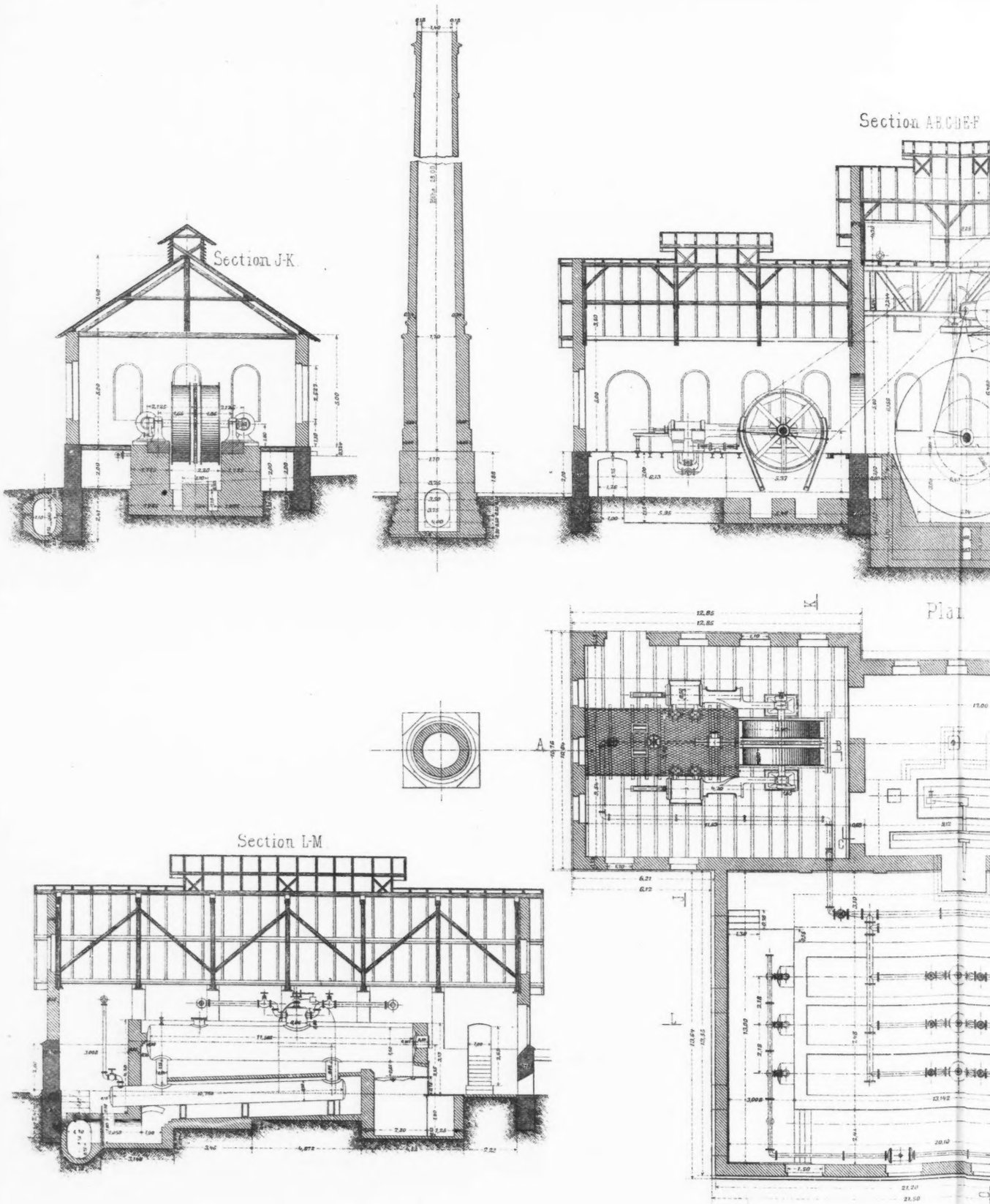
THE HOISTING AND PUMPING MACHINERY OF THE BINDWEIDE MINE, GERMANY.

(WITH SUPPLEMENT.)

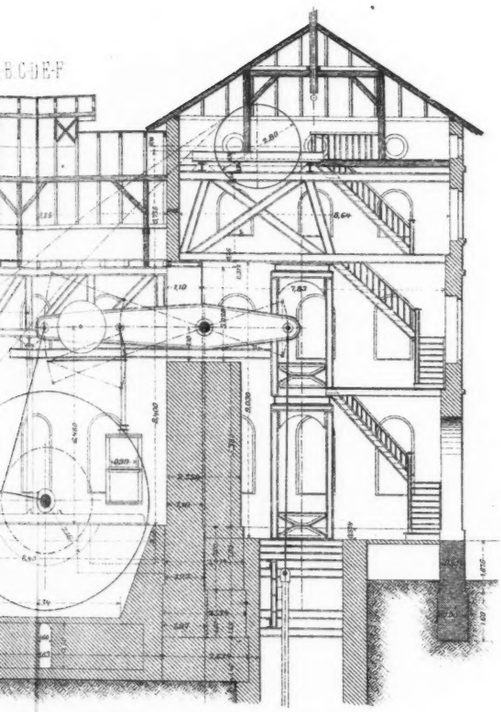
As an example of the design and general arrangement of mine machinery of modern type in Germany, we have chosen a series of illustrations accompanying a paper read by Herr Th. Peters, of Berlin, before the German Society of Engineers. We publish this week a supplement, showing the general arrangement of the plant of the Bindweide mine, near Steinebach, which we will follow in rapid succession with three additional plates, giving details of the machinery.

The mine works a system of approximately parallel veins of iron-stone cutting through the strata of the older Rhenish gray rocks. The apex of the veins and the outcrop of the strata are covered with *débris* of basalt partially decomposed and altered to a clay, which, where untouched, more or less effectually protects the mine against the influx of water. Along the outcrop of the veins, this protecting layer of clay has partly been removed by open cuts, and has partly been fissured by caves due to the collapse of underground workings, so that the surface water flows into the mine comparatively quickly. According to the weather, the quantity of water to be kept down is subject to considerable variations. Until recently, the mine had not been opened out below drainage level, but when, in 1880, the reserves had been nearly exhausted down to that level, arrangements had to be made for deep working; and in sinking a new machinery shaft, the leading considerations were to work the ore in the different levels in the shortest time and at the lowest outlay, to provide for the hoisting of both ore and men at the lowest cost, and to place the shaft so that its safety would not be imperiled by the old workings and by future mining. The position of the hoisting-engine and the boilers, in reference to the shaft, was dictated by local circumstances. It was decided to put it near the northeast side of the shaft. The pumping-engine might have been placed in any other position, but it was thought best to place it between the shaft and the hoisting-engine because the space between the hoisting-tower and the engine could thus be utilized, thus making the buildings cheaper and because the whole plant can be served much better. The drawing is so complete that it needs no further description. The measurements are all metric.

NEW YORK STATE CANALS.—The canals will be officially closed December 1st.



THE HOISTING AND PUMPING PLANT OF



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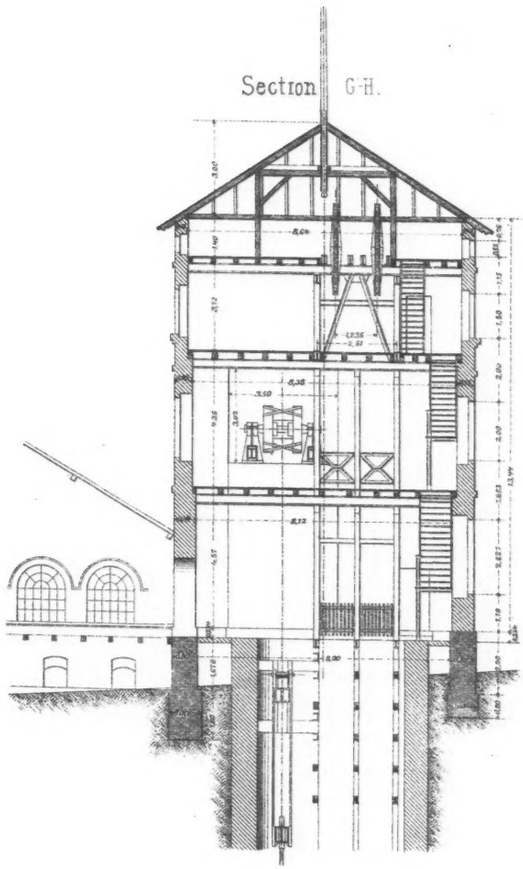

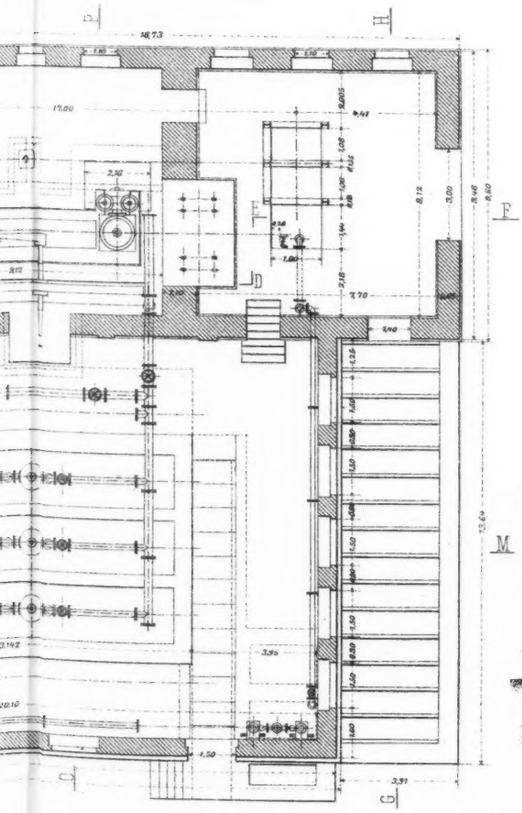

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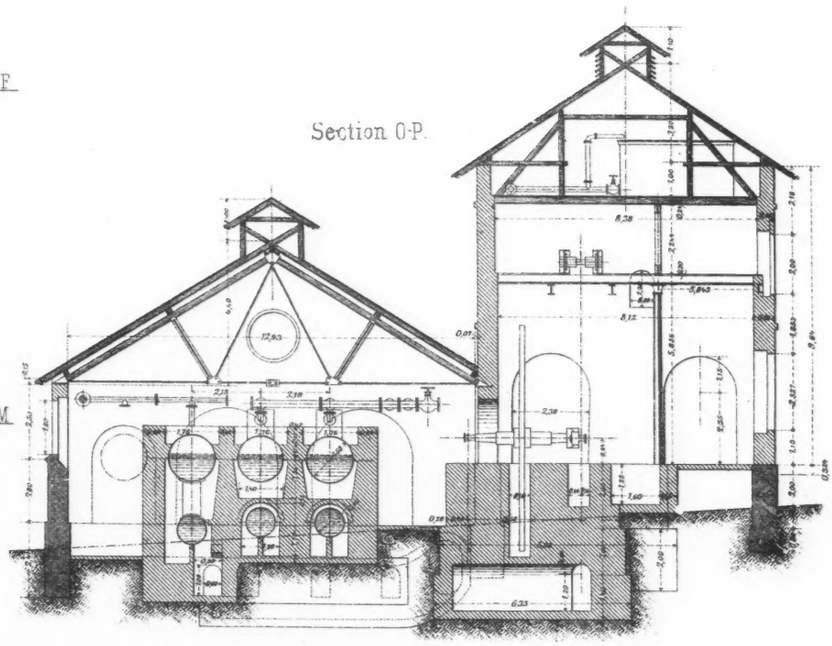


T OF THE BINDWEIDE MINE, GERMANY.

THE MINES AT RIO TINTO, SPAIN.—II.

The Spanish and Portuguese pyrites almost exclusively supply the chemical works of Great Britain. The Rio Tinto Company is one of the syndicate of the three largest mines, the Tharsis, the Santo Domingo or Mason & Barry, and the Rio Tinto, an agreement securing to the latter forty per cent of the English market and the monopoly of supplying the continent. The pyrites for export are carried in six trains daily, composed of 25 cars of 7 tons capacity each, to the port of Huelva, where there are shipping facilities to load four 2000-ton vessels at a time.

The pyrites treated on the spot constitute about three quarters of the entire quantity mined. Formerly, they comprised only one class, obtained by sorting out the export pyrites at the mine. Now the cobbing is much more complete and careful, the use of dynamite in blasting breaking the ore into smaller fragments. Five principal grades are sorted out, namely: 1st, smelting ore; 2d, roasting ore; 3d, ore to be subject to special treatment, in large heaps; 4th, ore to be treated by the new process; and 5th, cupriferous lead ores. The method of treatment of these different classes is as follows:

1. *Working the Rich Ores.*—Ores carrying from 7 to 8 per cent, the quantity of which has increased since opening out the San Dionisio lode, are roasted in heaps or *teleras*, in lots of 600 tons, the product being a mixture of oxide of iron, sulphates of copper and of iron, and kernels. To the roasted ore, is added silicecus raw ore carrying on an average from 2 to 3 per cent of copper, for the purpose of fluxing the oxide of iron. In smelting, old Spanish cinders, with 1·5 per cent of copper and a small quantity of limestone, are also added, the average percentage of copper in the charge being 45 per cent. Eight blast-furnaces, 16 feet high, equipped with a single tuyere, put through from 25 to 30 tons of smelting charge per day of twenty-four hours, with a consumption of 25 per cent of coke, costing delivered 32 francs per ton, and producing from 2 to 3 tons of matte carrying from 38 to 40 per cent of copper and a cinder running 0·4 per cent of copper. Assuming six out of eight furnaces to be steadily producing, the product annually would be from 5000 to 6000 tons of matte, equivalent approximately to 2000 tons of copper.

M. Cumenge gives the following analysis of a sample of this rich matte:

Copper	46·60 per cent.
Tin	26·74 " "
Lead	3·30 " "
Sulphur	21·28 " "
Arsenic	0·26 " "
Silica	0·80 " "
Silver	320 grains per ton.
Gold	4 " " "

This matte is sold in the English market.

2. *Working Roasting Ores.*—The roasting of the ores in large heaps has ceased to be, as it was formerly, the method employed for almost the entire mass treated. At one time, 300,000 tons of ore, roasting in immense heaps or *teleras*, belched clouds of sulphurous acid into the air, so that vegetation was killed for many miles around, and it was, when certain winds prevailed, almost impossible to work in the open cut, and claims for damages were pressing. Now only 50,000 tons are burning in such heaps, and the inconveniences from the fumes have ceased. The ore was and is leached in the manner to be described farther on.

3. *Ore Worked by Special Treatment in Large Heaps.*—Formerly, the ore was first roasted, as above, and was then leached, a process taking years for its completion, so that the old Spanish heaps still furnish copper. A new principle has been introduced, which, according to M. Cumenge, consists in utilizing, for the purpose of hastening the conversion of the copper into a soluble salt, the acid fumes which were formerly such a source of inconvenience. There is one large heap kept at a uniform hight. Around it, are formed smaller *teleras*, which are lighted, and upon which are thrown raw ore, and the ore roasted separately as above. The sulphurous acid produced by the combustion mixes with steam generated by the heating of the moistened heap, and thus sulphuric acid is formed. Whatever may be the theory of the complicated reactions taking place, so much is sure, that the heap composed of roasted and raw ore aggregating four millions of tons evolves no striking quantities of acid fumes. Its upper surface is watered like a vast meadow with great volumes of water, and from its lower portion drain brooks of cupriferous solutions. The latter are conducted by wooden channels or lead siphons into large masonry reservoirs lined with cement or with a mixture of plaster and tar. In passing through these reservoirs, the solutions come into contact with cast-iron or wrought scrap, on which the copper is deposited, while the iron goes into solution. This cement copper or "precipitate" is given the local name of *cascara*. Recently, this product is purified by dissolving out the slightly arsenical subsalts of iron by washing with slightly acidulated water and then with pure water. It is necessary then to dry it only, instead of calcining it in reverberatory furnaces, as formerly, to drive off part of the arsenic.

The precipitate which is sold in England carries from 75 to 80 per cent of copper. In order to avoid the expense of sacking, the waste in transportation, and the deductions for moisture, two large melting and refining furnaces are now constructing.

4. *Treatment of the Smalls by the New Process.*—All the fines and smalls produced in mining and sorting are to be treated by the Doetsch process, which has been applied with success on a large scale after some experimenting. Its principal advantages are, that it avoids previous roasting, reduces the quantity of iron for precipitation, and shortens the time in which returns are obtained. It comprises three operations: the solution of the copper in the raw pyrites by a liquor containing perchloride of iron, the precipitation of the copper in the solution so obtained by iron, and the regeneration of the perchloride liquor. The theory of the process is developed by M. Cumenge as follows:

The copper exists in the ore in the form of bisulphide and protosulphide of copper. In presence of perchloride of iron, these compounds are affected as follows:

$$CuS + Fe_2Cl_3 = 2FeCl + CuCl + S.$$
$$Cu_2S + Fe_2Cl_3 = 2FeCl + CuCl_2 + S.$$

What constitutes the success of the operation is the fact that the perchloride of iron in dilute solution attacks the copper pyrites rather than the iron pyrites, the latter practically remaining almost entirely unchanged. In the place of perchloride of iron, a solution of sulphate of iron and sea-salt is used, which, by double decomposition, produces perchloride of iron and sulphate of soda, the latter salt facilitating the reactions. The perchloride liquor is uniformly distributed by means of platforms on the top of the heaps. Vertical chimneys and horizontal flues, built up of dry masonry, give access of air. When the heap is builing up, the ore is mixed with one half of one per cent of salt and a like quantity of sulphate of iron, the hight of the heaps varying between 13 and 16 feet. When systematically moistened, ore containing on an average 2·68 per cent of copper has yielded 1·34 per cent, or one half, at the end of four months, while at the end of two years 2·20 per cent is extracted. From one eighth to one fifth of the entire quantity of copper in the ore is leached out in the first ten days, and the action becomes slower. It is the intention to take advantage of this, and three large basins are constructing to do the preliminary leaching, and then only will the ore be piled in heaps to follow the course thus far adopted. By way of comparison with the old method of roasting and leaching with pure water, it may be stated that only 1·10 per cent is extracted after the first two years. The preliminary mixing with a perchloride liquor before forming heaps will probably reduce the time required for the heap-leaching also, and it is expected that the ore will be practically exhausted at the end of two years. The liquor, as it comes from the heaps, carries from 5 to 7 kilograms of copper per cubic meter. The copper in this liquor is precipitated by means of iron according to the following formulæ:

$$CuCl + Fe = Cu + FeCl.$$
$$Cu_2Cl + Fe = 2Cu + FeCl.$$

As the solutions contain almost exclusively protochloride, from which one equivalent of iron precipitates two equivalents of copper, it will be readily understood that the consumption of iron is reduced. A record kept for two years proves that the quantity of pig-iron required for precipitating one of copper is 1·12 in the new process, against 1·56 to 1·70 in the old method. The precipitation is carried out in long, shallow masonry basins filled with pig-iron and old rails, which are cleaned out every four or five days, the product being a precipitate carrying from 80 to 85 per cent of copper. In the best precipitating-vats a cupreous mud, called *papucha*, is collected, which, being lower in grade, is smelted. The solution, after the precipitation, contains only 20 grains of copper per cubic meter.

In order to regenerate the liquor, containing almost exclusively protochloride of iron, a current of chlorine gas is passed through it. In order to produce the latter, a mixture of salt and sulphate of iron, collected on the banks of the Rio Tinto River or obtained from the old Spanish ore-heaps, is calcined in a reverberatory furnace, free access being given to the atmospheric air. In order to avoid the generation of hydrochloric acid, and transform into chlorine any small quantity which may be produced, a small amount of oxide of manganese is added to the charge in the reverberatory. The gas evolved in the furnace is conducted into a tower, to the top of which the solutions to be regenerated are pumped, and down which they descend in a shower, absorbing the ascending chlorine gas on the way.

There are now two heaps working containing 150,000 tons of ore each, and a third is preparing. A steam-engine is used to move the liquors, and the corroding action of the liquors upon pumps and pipes has been overcome, so that now the Rio Tinto Company is producing weekly 50 tons of copper by the new process. In order to provide for the development of this part of the business, a large mill has been constructed in order to crush ore to the size required for this special treatment, there being nine Blake crushers and a number of sets of Cornish rolls, with ample screen capacity.

5. *Working the Lead-Copper-Ores.*—There is at Rio Tinto a stock of several thousand tons of ores carrying considerable lead and a percentage of silver not yet sufficiently well ascertained. As yet, nothing has been done to provide for its treatment.

Estimates of Cost.—M. Cumenge has made a series of estimates of cost of production, which he considers will suffice to give a clear idea of the possibilities of the enterprise. He does not claim for them absolute accuracy, but he adds in a supplement a number of figures from other sources which corroborate his data and show his conclusions to be conservative.

COST PER TON OF COPPER DELIVERED IN ENGLAND IN THE FORM OF PRECIPITATE.

Fine Ore taken from Open Cut.

		Francs.
Dead-work and stripping		1·00
Mining, per ton of pyrites, labor, powder, dynamite, etc...	0·80	
Crushing, sorting, loading, and transportation	1·20	
Maintenance of tools, rolling-stock, and track	·50	
Total mining cost:		2·50
Discharging, making canals and heaps, general labor	0·30	
Water	0·25	
Total roasting and leaching cost:		0·55
Charging and discharging tanks, cleaning, maintenance	0·80	
Drying, purifying, and soaking precipitate	0·15	
Pig-iron, 17 kilos, at 100 francs per ton, delivered	1·70	
Total cost precipitation:		2·65
Cost per ton of ore		6·70
Cost of copper:		
100 tons pyrites, yielding one ton of copper in one year at 6·70		670·00
Freight to Huelva		2·50
Freight to England, insurance, cost of marketing, assays, differences in moisture		27·50
Cost of production		700·00
From ore from underground workings:		
Mining, labor, dynamite, etc	2·00	
Loading, hauling, discharging, sorting, and reloading	1·75	
Maintenance of plant and track	0·75	
Cost of mining:		4·50
Roasting and leaching		0·55
Precipitation		2·65
Total per ton of ore		7·70

Under the same conditions, the cost of production per ton of pure copper delivered in England in the form of precipitate would be 800 francs.

The further working of the heaps, after the extraction of one per cent by the old method during the first year, would cost per ton of copper:

Water	25 francs.
Precipitation	265 "
Transportation	30 "
	320 "

M. Cumenge reaches the conclusion that, as one half the copper is extracted from ores taken from the open cut and one half from subterranean workings, the cost per ton of pure copper laid down in England would be 750 francs, or £30 sterling.

The cost of the ore shipped for export delivered in England, would be:

Mining	4·00 francs.
Freight to Huelva	2·50 "
Freight, insurance, etc.	17·50 "
	24·00

The prices obtained for ore are a matter of agreement. The sulphur fetches 6 francs per unit, or 30 francs per ton, on the basis of 48 per cent. The copper, 2·5 per cent wet Cornish assay, would bring, on the basis of £65 per ton for Chili Bars, 27·75 francs, making the total 57·75 francs, or a profit of 33·75 francs per ton, at the prices then prevailing, but now reduced so that it is probably less than 30 francs.

M. Cumenge gives the following interesting estimate of the cost of producing a ton of 85 per cent precipitate by the new process, based upon the results of four months' working, during which 224 tons of precipitate were made:

Salt for chlorine and for mixture, 0·62 ton, at 68 francs	17·06	
Salt, 0·20 ton at 12 francs	3·00	
Coal, pump, labor	63.75	
Cost of dissolving		83·81
Iron, 1·12 tons	104·00	
Labor	77·16	
Cost of precipitation		181·16
Materials	5·25	
Repairing vats	11·87	
Freight on materials and machinery	4·00	
Maintenance of track	1·20	
Salaries and houses of employés	5·72	
General expenses		28·04
Total cost		293·01
Or per ton of pure copper		345·00

As the yield is at the end of four months 1·34 per cent, 75 tons of ore suffice to produce one ton of pure copper:

75 tons ore at 4 francs	300 francs.
Cost of treatment	345 "
Freight to Huelva, England, and miscellaneous expenses	30 "
Total	675 "

The water question is one that has been the subject of much thought at Rio Tinto. When it is considered that it takes 70,000 cubic feet of water per ton of cement copper produced, and that the quantity falling in the Rio Tinto water-shed is not more than 70,000,000 cubic feet, it will be understood that the production reached its maximum with 10,000 tons. This question has been entirely put at rest by the gigantic work undertaken, and now nearly finished, in the Odill basin at Campo Frio, ten kilometers from Rio Tinto. A dam 80 feet high has been built which will collect the rain-fall of 35 square kilometers, the capacity of the lake formed being about 10,000,000 cubic feet of water. A fifteen-inch pipe brings the water to Rio Tinto, and the supply will be sufficient to vastly increase the producing capacity of the mine.

THE ARLBERG TUNNEL.—The fragments of rock dividing the eastern and western galleries of the Arlberg tunnel were removed November 19th, in the presence of a notable assemblage. Baron Von Friedenthal, the Austrian minister of commerce, delivered an address in German and Italian. There was much enthusiasm. A special train passed through the tunnel from east to west.

MESSRS. KEUFFEL & ESSER, of this city, have just issued a new catalogue (price 50 cents) descriptive of the drawing materials which are their chief specialty, and of which they are both manufacturers and importers. They illustrate also their surveyors' tapes, chains, bobs, rods and poles, mining lamp and plummet, pocket compasses, sun-dials, levels, sextants, pedometers, transits, anemometers, etc.

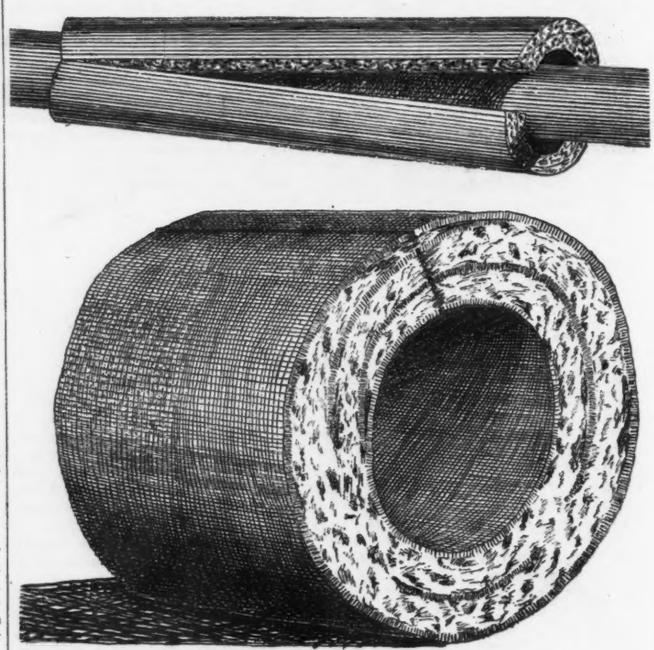
MR. JOHN MILLER, an enterprising business man and respected citizen of Altoona, Pa., died at his home in that place November 13th, at the age of seventy-eight years. While engaged in the coal business, a number of years ago, the deceased discovered and opened the celebrated "Miller vein" of coal in the Alleghanies, which has since been operated with such great success by the Cambria Iron Company. It is one of the finest coals in the State and makes excellent coke.

ECONOMIZING SPACE.—The New York *Sun* "condenses" as follows: "Of all the plans for economizing space," said a patent lawyer, "the man who just left this office evolved the funniest. He had a drawing of a sleeping-car that he wished me to get patented for him. He thought it was a good thing, and would hit the railroad managers hard, because it nearly doubled the number of berths in a car. I saw right away that the beds were ridiculously short. I asked their length. 'Four feet and a half,' he replied, 'and that's plenty long enough. A careful investigation has proved to me that there is really no use in a bed being as long as the person in it. Not one man in fifty ever sleeps straightened out, and women invariably draw up their knees, so that they don't require more than a four-foot bed. It is a discovery of this fact as to sleeping that I wish to protect by the patent. I should stick up in each compartment a printed notice explaining that the middle of the car is much safer than the sides, and, therefore, the closer their legs are hauled in toward the center partition, where their heads are to be, the less they are liable to be hurt by collision.'" The lawyer did not take the case.

A VISIT TO AN ASBESTOS MANUFACTORY.

We have had occasion recently to visit the factory of the Chalmers-Spence Company in this city, which has made the manufacture of many different articles from asbestos fiber a specialty. It needs only a cursory examination of the different processes which the raw material must undergo to appreciate the fact that it requires considerable experience and judgment to make the proper choice. It is convincing too on the point that asbestos may appear to possess every requisite, and yet the same may be practically valueless. The first desideratum is length of fiber; and secondly, a certain toughness and elasticity which many specimens do not possess. We have seen good-looking material which was "rotten," and would warn those of our mining friends whose spirits may run high upon the discovery of asbestos, not to allow their hopes to run away with them, until the material has been examined and tested by parties whose experience in manufacturing has made them competent judges.

The rock, as it is received by the Chalmers-Spence Company, is put through a machine on the ground floor, which by a system of rollers separates the fibers from one another. The material so obtained is carded, by which the rock is taken out and the fiber is separated according to length, the shortest being used as paper stock. It is sent to paper-mills, where board is made of it. The longest fiber is made into yarn on a special machine, the product serving as the basis of all the asbestos textile



CHALMERS-SPENCE PIPE COVERING.

fabrics made. For cloth, there is a special loom. Other grades of the fiber are made into felt by a special machine, which has appliances for insuring uniformity of thickness and the needed degree of cohesion.

Beginning with the yarn, it is used in that form for wick packing for valve-stems; in larger form, it is applied for packing of all kinds; and to better adapt it to that purpose, the packing is prepared with a variety of lubricating materials. The asbestos cloth is used in many different ways which it is needless to enumerate. The boards and sheathing made from the paper stock are shaped into gaskets, and into such forms as are required for steam-joints, etc. The sheathing is used as such for insulating purposes and as a protection against fire between floors. One of the most recent of these applications for fire-proofing is inside of elevators, which have of late years proved such disastrously convenient avenues for the spread of fire in large buildings. It appears much more suitable for that purpose than the sheet-iron lining of elevator shafts, which we have had occasion to notice in some recently finished buildings. As we shall note farther on, asbestos board enters largely also into pipe and boiler coverings, which form the most important outlet for the bulk of the asbestos manufactured. The methods of manufacture of the many varieties of non-conducting coverings are simple. The latest form adopted by the Chalmers-Spence Company is that shown in the accompanying engravings.

As will be seen, it consists of a sheet of asbestos board, upon which is laid a layer of asbestos felt. They are together wrapped into a circular form, so that in section the board has the shape of a spiral, with layers of the loose asbestos fitting between it. The tube is simply slit longitudinally, so that it is only necessary, in order to put on the covering, to force it apart and slip it on, in the manner shown in our engraving. It is necessary to state, however, that our artist has omitted to show a flap, a continuation of the outer covering, which, when the pipe is in place, covers the joint. These movable coverings are made in sections three feet long, for any size of pipe needed. They weigh about one pound per square foot per inch of the thickness of covering. It may be of interest to state here that the Chalmers-Spence Company also makes a non-conducting plaster covering, in which asbestos fiber is used as the binding material, the covering weighing only two pounds per square foot per inch of thickness. This covering, besides its lightness, has special merit as a fire-proof material, and

is also used for fire-proofing walls, etc. A crucible made from it for purposes of experiment showed it to be capable of resisting the highest heats. The Chalmers-Spence Company also puts up coverings with an air space, using it largely for extensive surfaces as on marine boilers.

The asbestos felt, placed between an inner and outer layer of asbestos board, is also put up in square sheets about one inch thick, to be used principally as a removable covering for boilers, notably for high-pressure steam. Where hair felt is preferred, asbestos sheathing is used in the same way to protect the hair against the singeing due to direct contact with the hot surface. It will be noted that the asbestos industry has been thoroughly developed, and that in one or the other form the prepared material is made to do service for a large variety of purposes. A disposition is shown to meet the wants and fancies of consumers, manufacturers avoiding the error too often committed by those developing a specialty of insisting that there is but one way, and that is the one they have chosen. Asbestos in its many forms is now largely applied by mines, furnaces, mills, factories, and steamships, and it is a gratifying fact that, in the case of the latter, it is no uncommon occurrence for American makers of boiler coverings to be called upon to replace by articles of their own make the covering put on in England.

ADDRESS ON MECHANICS BY COLEMAN SELLERS, SR.

On November 9th, Mr. Coleman Sellers opened the course of lectures in connection with the Franklin Institute with an address on Mechanics. We are indebted to the *American Machinist* for the following abstract: The lecturer began with a review of the origin of their lecture course. During the first season, the lectures were confined to men, but in the following year ladies were admitted, and this has continued to be a feature of the meetings ever since. Although the subjects treated are principally those relating to mechanics, the attendance shows that they are found interesting to ladies.

If we consider what was the state of the mechanic arts at the time the Franklin Institute was first founded, and what is the state of the same arts now, we can form a better idea of what the lecture course was in those days and what is expected of the lecturer of the present day. In business, nowadays, we measure the success of mechanical enterprise very much by the prosperity of the railroads. I think it would be fair to take the success of the railroads as the standard of the progress of the United States during the sixty years that have elapsed since the first lecture was delivered. It was in 1824 that George Stephenson began striving to induce the people of England to build the Liverpool & Manchester Railroad. In 1825 he was laughed at as a visionary. You will find books in the library that refer to the bubbles talked of in 1825, and the contemplated Liverpool & Manchester Railroad is referred to as the wildest of all the bubbles. At that time, the term locomotive as applied to that form of engine was not invented. It was not until 1829, when that railroad was opened, that the term came into use. But we had locomotives before that time. In 1819, Oliver Evans took through the streets of Philadelphia an old scow which moved itself by steam. Evans foresaw the important factor that steam was destined to act in accelerating land transportation. He said the time would come when we should start in the morning from Washington, breakfast at Baltimore, dine at Philadelphia, and sup in New York, and that would be going at a speed of forty-five miles an hour, as fast as a bird flies. Even in 1825 the world was not ready for this. The proposition of traveling at fifteen miles an hour was laughed at. Trains might be run, but they must be slowed down to five or six miles an hour, so as not to ruin the stage coach companies!

Great advances have been made since those days, and all other institutions have moved forward keeping pace with the railroads. To the people in Wall street, railroads merely represent certain values in money. By the people generally they were viewed from a much higher plane. To those who are assembled here in Philadelphia, the railroads are the embodiment of thought, and of more value than can be measured. We see this illustrated in the Pennsylvania Railroad we are so proud of and its fine machinery.

When the Franklin Institute was founded, it was intended to carry on a school of instruction for mechanics, to impart desired instruction which could not be obtained in the public schools. The mechanic indeed must not only be a physicist in the broadest sense of the term, but there is scarcely a limit to the knowledge he must bring to his use in some way. Some one has said that a man must understand matter and apply common sense to it in order to be an engineer. The aim of our institution has been to help mechanics to understand matter and the natural laws underlying their work. In the early days of the institution, the lectures were elementary but essentially practical. They were the best that could be delivered here at the time, and could not be obtained at any other place. What has been the result of this? Gradually the people have begun to recognize the need of more information than is given in the public schools. The high school of Philadelphia is the direct outgrowth of the Franklin Institute. In this and other educational institutions, it is possible for young men to obtain excellent instruction; but so far as training relating to the mechanic arts is concerned, much improvement is needed. It is possible to have taught in the public schools the underlying principles of manual labor. There are a few simple tools that are used in a great many trades. Their use might be very judiciously introduced in the course of study. In our early history, the workshops were not far removed from the schools. It was almost impossible to attend school from one year's end to the other. A lad had to work in the shop or on the farm for some months of the year, and he could attend school the rest of the time. What was the result of this? Its tendency was to produce good solid men who were daily applying their school instruction to workshop manipulation. Who were made by this kind of training? The men who have taken the lead in building up our system of railroads, our workshops, and our factories.

What is the result of the later system of training in the public schools? The students are separated entirely from manual labor, and their heads only are developed, and this development fitting them only for the professions of doctors, lawyers, and what not. And not one single thing has come to them that will help them to enter a workshop. There is a very simple reason for this. The teachers are not mechanics. They are not expected to be. The scholars can more easily learn the things that relate to buying and selling than what relates to mechanic arts. The instruction given in the schools must bear the teacher's idea. Very few teachers in public schools are expected to understand the principles of mechanics. The examples prepared for the scholars are not taught as having relation to mechanical work. Yet many of the calculations apply as correctly to the operations of machinery as they do to the business of buying and selling. If mechanical operations were taught in schools, it would give a rest to head labor, and the hand labor would make the brain stronger.

Mr. Sellers then reviewed at considerable length the lectures of the course and their objects, highly commending all the coming lectures.

Returning to the subject of mechanics, Mr. Sellers said there was a time when the two-foot rule and a few simple tools readily answered all mechanical purposes for measurement. There was a saying in Germany that every hair in a carpenter's head is one eighth of an inch diameter. There was a meaning in that. As a carpenter does not measure so fine as a machinist does, his measuring to a hair's breadth was measuring within one eighth of an inch. That style of measurement led to the expressions "overfull" and a "little scant," which indicated measurements sufficiently close for practical purposes. A change in this respect has come over all mechanical industries. Now the parts of machines are made interchangeable, and accuracy of dimensions must be obtained. One branch of business may need only coarse measurements, while another may require the most minute measurements and accuracy. A two-foot rule may answer for many purposes and be very convenient, but there are measurements in the works which require the use of this convenient little device which measures to one thousandth of an inch. (Here he showed a Brown & Sharpe micrometer caliper. He also exhibited a French micrometer gauge, finely graduated. This he used to measure fine metallic cubes that had been finished by tool work alone, and were surprisingly accurate.) These instruments, continued Mr. Sellers, are remarkably fine; but Mr. Bond, who will lecture during the course, is connected with a shop (Pratt & Whitney's) that makes gauges of various kinds, and there they have perfected a machine which records more closely the actual size of materials than any thing ever made before.

Every thing in nature obeys certain fundamental laws, and all mechanical movements are regulated by these laws. There are certain principles of movement called mechanical powers, as the lever, the wedge, the screw, the pulley, that are used in various forms through all machines. The building of a complex machine seems very much like the forming of a complex sentence. Letters combined form words, words combined form sentences, and sentences make books. In the locomotives that pull trains from ocean to ocean, we have combined all the mechanical elements, wheels, pulleys, levers, and screws. We have beautiful sentences in mechanics as well as in books. One maker produces better arrangements in his machines than others, and so he makes a more harmonious machine than his neighbors. In the same way, one author combines his sentences better than another.

After reading some sentences in Ball's work on mechanics, a book which he cordially commended, Mr. Sellers proceeded by the aid of models and diagrams to elucidate the principles of virtual velocities. In a clear and interesting manner he demonstrated the relations that exist between speed and power in the application of the various forms of levers to machinery.

In computing the power of machines, he continued, friction must be well considered or mistakes will be made. A considerable proportion of the power of machines is absorbed by friction, but friction is valuable to the mechanic for all that. But for friction, a locomotive could not pull a train, because the wheels would slip around without moving ahead. In fact, at first they thought that friction between the plain wheel and rail would not suffice to make a locomotive pull a train, and they proposed to lay down a rack-rail for a cog-wheel on the engine-axle to work in. This was one of the first obstacles to the success of the locomotive; but they soon found that a rack-rail was not needed. Another example of friction is rather striking. The transmission of power from the steam-engine to the various parts of a machine-shop is usually effected by a line of shafting. Now, in quite a large machine-shop, when the belts are thrown off, one man can take hold of the rim of the main pulley and turn all the shafting. Let us see what work the man is doing in relation to what the engine has to do in turning the shaft. The man employs his weight of 150 pounds to the outside of the wheel, and he would have to turn it 120 feet a minute to keep it at the speed the engine has to maintain. Thus you have between 12 and 13 horse-power consumed in running the shafts of that shop. The man does not exercise one horse-power, though he may have a cold and be a little *hoarse*. A horse-power is 33,000 pounds raised one foot in one minute. One pound raised 33,000 feet in one minute would be the same power exerted. On this basis, all engine work is measured.

By means of a Weston differential pulley-block and chain, and also the Harrington hoist apparatus, which has pulleys operated by a worm screw, Mr. Sellers showed the principle of applying power in that way. He also demonstrated the loss of power by friction in the two kinds of apparatus and in a train of wheels. The amount of pull required to operate the chains was ascertained by means of a spring balance. The different apparatus showed a striking difference of loss due to friction of the working parts, but in the best performance the loss was considerable.

Now, said Mr. Sellers, it is the want of this kind of knowledge that should be met by the public schools. That is felt in the community in the ready acceptance of things that are impracticable. It is not a new thing for persons to think that perpetual motion is possible; and it is not a new thing for people to say they have discovered perpetual motion when they know they have not. There are many cranks besides the crank that turns the grindstone, but the worst crank is the crank who is going to improve on the crank. Perpetual motion is a wrong idea. When people become pretty well acquainted with the principles of mechanics and with the laws of the universe, they can be shown that perpetual motion is impossible. Those who understand the laws relating to the conservation of energy know that no power can be obtained without the dissipation of energy. Falling water may keep a mill-wheel going continually till the parts wear out, but the water has been raised above the wheel by the sun's rays. That is no perpetual motion; it is power begotten of heat. Heat may be applied to water to tear the atoms asunder till they exist in the

form of steam which is capable of doing work; the atoms of water may be still further heated till they are separated into their elementary gases; but the work to be got from them in either case will be less than the heat energy expended. When we burn coal in the furnace of a boiler, it is converted into heat, and heat boils the water, and the water converted into steam drives the machinery, and we call it very justly the steam-engine. The steam-engine does not use all of the heat by any means; probably not more than 12 per cent of the heat coming from the coal is utilized in our best engines. What a long distance between the actual practice and what we may hope to obtain some day in the perfection of mechanism!

More than seventy years ago, a great furor was created in this country by a citizen of this State named Readheifer, who claimed to have invented a machine that would run without the expenditure of power. The pretended discovery was puffed in all directions, just as similar schemes, some of them not a hundred miles from Philadelphia, are advertised to-day, and a great many people believed in Readheifer's machine. The Legislature of Pennsylvania appointed a commission to examine the machine, and Mr. Sellers's grandfather was one of the commission. Like other pretended discoverers of marvels, Readheifer would not permit the commission to take the machine apart. This made a rigid examination difficult; but Mr. Sellers, being a mechanic, discovered that the motive power was clock-work placed in the base of the machine and applied in an ingenious way.

The perpetual motion humbug appears under various disguises. Some time ago, a great stir was caused in England by the alleged discovery of a new power called psychic force. A scientific gentleman in Philadelphia got deceived by this pretended force, and the performance of a spiritualist which he had witnessed confirmed his belief. This gentleman often talked with Mr. Sellers on the subject of this new force, and nothing seemed able to convince him of its fallacy. One evening he called at Mr. Sellers's home, and when they were conversing, another scientific friend came in. The subject of the new force was again discussed, and Mr. Sellers volunteered to show some of its manifestations. He took a round ball which he had previously prepared by putting holes through it, one of them having the form, in longitudinal cast-iron, of a trapezoid. Now, he said, here is a round ball with a straight hole through it, and he pushed a pencil through the hole to prove it straight. Then he pushed a small rope through the ball, and stretching the rope between his hands, he put it in a vertical position and made the ball descend, fast or slow, just as he wished. The credulous scientist at once concluded that Mr. Sellers was exerting mind influence over the ball, but the other set his inventive faculties to find out the trick. He guessed that the hole was not straight through the ball, and that Mr. Sellers controlled the speed of the ball by tightening the rope. This was the truth. Instead of pushing the rope through the straight hole which was there for deception, he worked it through the crooked hole, and by that means was able to control the ball. Here were two men, both of them scientific gentlemen; one of them investigated the phenomenon, and the other believed what he saw.

In the consideration of every thing that is going on in the world, in investigating matters connected with these elementary powers and other mechanical questions, you can not be too well grounded in the laws of mechanics. That will give you ability to understand the kinds of appliances that can be utilized in your work, and will guard you against deceptions.

FAST WORK IN A TUNNEL.—A correspondent of the *Railroad Gazette*, writing to that journal from Moshannon, Pa., says: "The following is a statement of working hours, number of shifts, and distance run during the month of October in the heading of the Moshannon Tunnel on the Beech Creek, Clearfield & Southwestern Railroad, near Snow Shoe, Pa. The material encountered in driving this heading was the sandstone lying immediately below the lowest or 'E' vein of the Clearfield bituminous coal formation.

"The details of the work are as follows:

Number of headings		2
Dimensions of heading	7 feet	16 feet
Distance run from October 1st to 31st inclusive		499 feet
Number of shifts		50
Hours per shift		11

"The drills used were two Ingersoll, supported on columns in each heading. The system of working was the American 'center cut.' The best work for one week of 11 shifts was 119 feet. Each heading was closely followed by a 'bench' over which ran the pipes conveying compressed air to the drills in the heading. As it was necessary to disconnect these pipes when blasting on the bench, the progress of the heading was somewhat retarded. We claim this as the best time on record, and as the question is of general interest, and a discussion of the facts most desirable, we beg you to publish this claim in your valuable paper."

Another correspondent, writing from Binghamton, says: "In the tunnel taken out for use of the south-bound track at Factoryville, Pa., on the main line of the Delaware, Lackawanna & Western Railroad, the heading was driven during the month of April, 1883, 471 feet. The new tunnel being parallel to the old one, and 16 feet of rock left between them, it was found necessary, for ventilation as well as convenience, to draw a 7-foot cross-cut through from the new to the old tunnel. There were no shafts. The cross-cuts driven in April were two, size about the same as the heading, 7 by 16 feet, making a total heading of 503 feet. Nature of rock, blue, red, and gray sandstone making a good roof, with no arching necessary. The drills used were two Ingersoll, supported on columns, in each heading. The system of work was taking out the center cut. The heading was driven in two ends and 11-hour shifts. The drills were worked by compressed air. Benches followed the heading, both worked at the same time. Care was used, which necessitated lighter blasting on account of the old tunnel, about forty trains passing through it every twenty-four hours each way, making it necessary to look after the safety of about eighty trains.

"The work was divided as follows:

North end, 246 feet heading and 16 feet cross-cut.....262 feet.
South end, 225 " " " 16 " " ..... 241 "

'This made the total of 503 feet for the month."

We believe that some of our mining friends can contribute "big records" that will match the railroad men.

FURNACE, MILL, AND FACTORY.

Hendey & Meyer, Denver, Colo., are building the machinery for the new ore-sampling works at Denver. Among other things, is a pair of three-foot crushing-rolls, said to be larger than any hitherto constructed.

Lucy Furnace, at Orbisonia, Huntingdon County, will blow out soon on account of the low price of iron. The owner is John Whitehead, the coal operator of Orbisonia.

Messrs. Reis Brothers, of New Castle, have sold their interest in Neshannock furnace to A. L. Crawford for $95,000. Mr. Crawford holds it until the organization of a company now under way is completed. The rebuilding of the furnace is rapidly nearing completion.

Owing to the continued decline in iron, the Pottstown Iron Company, of Pottstown, employing several hundred hands, announces a reduction of wages of about 10 per cent, beginning December 1st. Some other mills in the Schuylkill Valley contemplate similar action.

The Cambria Iron Company, of Johnstown, has notified its 5000 employés that on December 1st wages in all departments will be reduced 10 per cent, owing to the depression in trade.

Work began November 6th at the Kelly Nail and Iron-Works, at Ironton, and the forge department, with fourteen boiling-furnaces, is running double turn. Thursday, the 8th, the plate-mill went on, there being a single set of hands at each of the three heating-furnaces. On that day, too, a few nails were cut by way of experiment. The nail factory was started on the 14th instant, there being sixty machines in position and now in operation. The railroad from the coal mine in the back of town to the mill is now in operation, the coal being dropped from the tipple-house into the cars and from the cars into the bunkers alongside of the furnaces. When the Kelly mill gets to running full, it will give employment to about 300 hands. It is estimated that the building and operation of the mill have added 1500 people to the population of Ironton.

Five barbed-wire machines, capable of making 100 pounds of finished wire every ten minutes, and twisting 18 barbs on the wire simultaneously, and adjustable so as to make either a two or four-point wire, have just been perfected by S. M. Stevens, of De Kalb. These machines are for the Astley Wire Company's works at Joliet, Ill.

The nail and tack mills of Chess, Cook & Co., at Pittsburg, Pa., have not shut down, as was reported. No suspension will take place before the regular one ordered by the Western Nail Association.

Notice of a change of the name of the Northwestern Steel Wheel Company to the Star Wheel Company, a Chicago concern, has been filed and recorded.

The Neshannock furnace, in New Castle, with eighteen acres of land, has been sold by Reis Brothers to A. L. Crawford for ninety-five thousand dollars. William Reis will continue as manager of it.

Andrews & Hitchcock's furnace No. 2 at Hubbard, O., which has been out of blast undergoing extensive repairs, has been blown in again. The furnace has been remodeled according to the latest plans, and, when running smoothly, it is expected will produce over 100 tons of metal per day.

A report from Cleveland says that the late Amasa Stone owned 600 shares in the Kansas Rolling-Mill Company, which collapsed some time ago, and as under the laws of Kansas the stockholders of a stock concern are individually liable, suits have been begun by Myron T. Herrick, who has come into possession of all the claims against John Hay and Samuel Mather, executors of Amasa Stone, to recover $175,000.

MINERAL PATENTS GRANTED BY THE UNITED STATES LAND-OFFICE.

ARIZONA.

TUCSON DISTRICT.

Arizona & Utah Gold and Silver Mining Company, Newton lode.

CALIFORNIA.

SACRAMENTO DISTRICT.

Kenton Mining Company, Kenton quartz mine.

COLORADO.

CENTRAL CITY DISTRICT.

E. E. Wentworth *et al.*, Crystal and Louise lodes. Nels Johns, Carroll lode. Russell F. Lord, Precinct lode. Leopold Sternberger, Di Vernon lode. Chicago & Colorado Mining Company, Yellow Bird lode and mill-site. Nathaniel J. Moss, Oneida lode. Henry M. Thompson, Lewis and Hyland Extension lodes. W. S. Wells *et al.*, Wells, Ina, and Times lodes.

LAKE CITY DISTRICT.

William Krager *et al.*, Dora lode. Henson Creek Reduction Company, Capitol iron placer, Treasure Hill Spar lode, and Mary Lime lode and mill-site. W. Weston *et al.*, Conqueror lode and mill-site. Park Gold and Silver Mining and Smelting Company, Red Gulch lode and mill-site. S. R. Beckwith *et al.*, Alice lode. Green Mountain Mining and Milling Company, Green Mountain, Linda Belle, and Nathaniel Slaight lodes. Michigan & Colorado Mining Company, Silver Urn and Silver Cord lodes, and Silver Islet and Silver Age lodes and mill-sites.

LEADVILLE DISTRICT.

Golden Comet Mining Company, Goddess of Liberty, Pacific, Shenandoah, and Raven lodes. Terrible Mining Company, Terrible lode. Henry Weil *et al.*, New Year lode. N. N. Atakinson, Charlie Ross lode. Andrew Augustine, Alma lode. R. J. Lipe *et al.*, Willie Warner lode.

DAKOTA.

DEADWOOD DISTRICT.

Cephas W. Carpenter, Rattlesnake Jack lode.

MONTANA.

HELENA DISTRICT.

James A. Murray *et al.*, Sarsfield lode. Montana Copper Company, Iron Side lode. Daniel Garver *et al.*, placer (Silver Bow County). Henry Neill *et al.*, placer (Lewis & Clarke County).

UTAH.

SALT LAKE CITY DISTRICT.

Moylan C. Fox *et al.*, Azure Queen lode. Peter S. Martin *et al.*, Uranus lode. Samuel W. Smith *et al.*, Red Bird lode. Romeo Consolidated Mining Company, Augustus lode. Heirs of Austin Chambers, deceased, Union lode. William F. Williams, coal. A. Lewis Williams, coal. Edward L. Carpenter, coal.

GENERAL MINING NEWS.

ARIZONA.

COCHISE COUNTY.

ATLANTA.—Work on the tunnel at the east end has been discontinued. The carbonate of lead found at the west end does not seem to be in such large quantity as was expected, but lying below these carbonates nickel has been found which may turn out to be a find of some importance for the camp.

TOMBSTONE DISTRICT.

CONTENTION.—The pumping machinery will be ready to start up December 1st. It will have a capacity of 700 gallons a minute.

EMPIRE.—The new shaft is down 13 feet. The course of prospecting in the old workings has been changed since the strike in the Girard, because it is

thought that the same ore-body extends into this ground, and drifting is now done in that direction, with the expectation of meeting it.

SYDNEY.—This mine lies parallel with the south extension of the Grand Central, and is undoubtedly a very promising property. It is worked through three shafts. The north shaft is down 113 feet. At this depth, a cross-cut and drift have been started. From the south shaft, a cross-cut was run, which, 120 feet west of the shaft, encountered an 8-foot body of chloride ore.

WAY UP.—No more work will be done until after the decision of the pending lawsuits.

MOHAVE COUNTY.

MATHILDE.—All the ore in the mine is high-grade copper rich in gold, of which there are at least 2000 tons in sight, and when the veins of ore in the south end of the claim have been undercut by the tunnel, a large quantity of ore will be exposed. A thirty-ton water-jacket smelter, with sufficient coke to run for two months, is at Aubrey, awaiting transportation to the smelter-site, which is located ten miles from the mine, on Bill Williams Fork, where there is abundance of water. Iron wood and palo verde grow in large quantities within a mile of the smelter-site, and can be delivered there for $4 a cord. Freights on ore from mine to smelter-site are $3.25 per ton. A road has been constructed from the mouth of the tunnel at the mine to the smelter-site.

PIMA COUNTY.

TUCSON SMELTING AND MILLING COMPANY.—The adjourned annual meeting was held at 408 Congress street, Tucson, recently. The new Board of Directors is: James H. Toole, Aaron Mason, H. S. Stevens, Samuel Hughes, R. C. Pearson, R. N. Leatherwood, Joseph C. Perry. Work will be commenced as soon as they can contract for enough lead flux to insure a steady run. There are sufficient iron and lime fluxes. Then the sampling-works will be put up immediately and work begun at once on the smelter.

PINAL COUNTY.

SILVER KING.—Mr. R. W. Phillips has resigned, and Mr. Arthur Macy has been appointed superintendent.

WINDSOR.—Work has been stopped for some unknown reason.

YAVAPAI COUNTY.

ARIZONA QUEEN.—The mines are rapidly opening up. The work on the Chicago mine, owned by this company, is prosecuted night and day, and a new body of good ore for stoping is rapidly developing.

SENATOR.—The old mill is to be started up and run exclusively on custom ores.

CALIFORNIA.

EL DORADO COUNTY.

MORRELL CONSOLIDATED.—This mine adjoins to the once famous Cedarberg. Present developments indicate that the owners have in their property a well-defined ledge rich in gold-bearing rock. The mine has a six-stamp mill. A 120-foot tunnel, now run, shows some very rich gold-bearing quartz. Another tunnel, designed to tap the lode at a depth of 50 feet, is running. The tunnel will give a sufficient test as to the value of the mine. The ledge and ledge matter are two feet thick, and are said to be rich.

FRESNO COUNTY.

A description given of the resources of this county states that many discoveries of late years show much free gold and only await the coming of capital and labor to prove very remunerative. During the last decade, the mining interests of this section have greatly revived under the stimulus of important developments in a number of quartz ledges. Extending from Dry Creek north a distance of about sixty miles, is a country containing large and well-defined quartz veins. Some have been thoroughly prospected and assays have shown the presence of either gold, silver, copper, or iron—in many instances, in paying quantities.

PLUMAS COUNTY—GREENVILLE DISTRICT.

ARCADIAN.—For some months past, a tunnel has been run to explore the ledge at a greater depth. The ledge has been reached, a drift started, and an ore-body opened up that is much superior to any found in the upper tunnels. No great amount of ore has yet been taken out. A succession of tunnels has been run, to test the ledge at different depths.

CHEROKEE.—The mine is in charge of George Standart, and he has a few men at work drifting.

MICHIGAN HILL.—Operations have been resumed.

PLUMAS-EUREKA.—An agreement has been entered into between this company and the owners of the Halstead mine at Rich Gulch, by which the former is to finish a tunnel already partly made, to prospect the ledge. If the company is satisfied with the prospect, it is to have the entire claim of 6000 feet by paying to the present owners $60,000. Work will at once begin.

SANTA CLARA COUNTY.

QUICKSILVER MINING COMPANY.—A dispatch to the New York *Tribune* says that a suit involving $20,000,000 was begun at San Francisco, November 20th, the widow and heirs of John Bowie Gray bringing suit against the Quicksilver Mining Company, of New Almaden. Gray, who was one of the three original proprietors of the mine, died in New York in 1861. The action is based upon the alleged fraudulent administration of the property by Robert J. Walker, formerly Secretary of the Treasury, who had been a partner of Gray, and was until recently the chief representative of the company.

SIERRA COUNTY.

It is reported that very extensive mining operations will begin at once on the Gibsonville and La Porte Ridge, and in the Sawpit country, under the general management of Mr. J. H. Thomas, backed by English capitalists. The company is prepared to expend a large sum of money in developments.

GRIZZLY.—This ledge, which is near the Alaska mine at Pike City, is now reopening by direction of the present owner, M. I'Anson, of Newark, New Jersey. The Grizzly ledge was originally located in 1854 by some miners, who found rich gold quartz in the croppings. At various times since, the ledge has yielded rich specimen quartz, but the vein is a milling ore, carrying fine free gold and sulphurets. A working adit is driving from Texas Ravine that will tap the lode at a considerable depth below the present workings.

CANADA.

NEW BRUNSWICK.

Work on the Dorchester copper mines is progressing. About fifty men are employed.

BELLIVEAU ALBERTITE AND OIL COMPANY.—The diamond drill, at the depth of 650 feet, passed into oil shale, and soon oil in considerable quantities came up with the water used in working the drill, and has continued to flow to a more or less extent to the present time. Since striking the oil, the drill has passed through 100 feet of this oil shale, and now, at the depth of 750 feet, where they are operating, this shale has become very soft, and a larger flow of oil came up than at any one time before. Some of this oil shale is so thoroughly impregnated with oil that, after being brought up and exposed to atmospheric action, quite large globules of pure oil ooze out on its surface.

COLORADO.

BOULDER COUNTY.

DIRIGO TUNNEL.—Work is steadily progressing, the tunnel having already penetrated the mountain 600 feet, intersecting a number of large veins of low-grade ore. The company proposes to continue work steadily until the Yellow Pine vein is reached. The tunnel intersects the New Enterprise and the western extension of the Williamson group. The company owns twenty-two claims on the line of the tunnel.

CHAFFEE COUNTY.

COLUMBUS.—It is stated that the mill will close down for the winter. Operations on the mine will, however, continue during the season.

GILPIN COUNTY.

CALIFORNIA.—The company now employs 30 stamps of its 50-stamp mill in Black Hawk, as also the full capacity of the Hidden Treasure 50-stamp mill on ore from that mine, making a total of 80 stamps now employed. In the California mill proper, there is attached to two five-stamp batteries a Frue vanner, the slimes from the batteries being deposited in a receptacle and thence elevated and treated on the Frue vanner. So far, it has proved very successful, and quite a saving over manual labor.

HINSDALE COUNTY.

ILLINOIS BOY.—This mine has been sold to the White Cross Mining and Milling Company. The mine will be worked at once.

LAKE COUNTY.

AMIE.—The company and lessees are both working, and nearly every shaft on the claim is operated.

CHRYSOLITE.—The shipments of iron ore by lessees have been suspended. The Marden lease on the Chrysolite mine, embracing the northwestern portion of the mine's old workings, has recently disclosed some very high-grade ore, and mineral in considerable quantity is hoisted daily that is literally covered with chloride of silver.

CUMMINGS & FINN.—These works will hereafter be known as the Fryer Hill smelter.

DAISY CONSOLIDATED.—The tramway, about 1200 feet long, running from the mouth of the Daisy tunnel proper down the steep mountain side to the ore-bins in the valley is almost completed. The Daisy tunnel shows ore-bodies that run from 80 to 300 ounces. The ore has an iron base, and carries about twenty per cent in lead. Work in the Elk tunnel of the consolidation has been postponed, owing to the fact that there is no way of taking care of the ore at the present time, nor will there be, perhaps, before spring. The ore in this tunnel is not as high-grade as that of the Daisy, but it shows a higher grade in each week's development. In excavating for the foundation for the hotel, a body of mineral has been exposed which has proved the richest and most extensive of any in the consolidation. It is an eight-foot vein of sulphurets, which runs about 300 ounces in silver and carries thirty-six per cent in lead. The vein has been cut in several places, and shows itself to be a true fissure, from which a large quantity of ore has been taken. Just above and to the left of this unexpected discovery, is another vein of high-grade ore which shows a large body of mineral, the extent of which is not at present known. Drifts, tunnels, and shafts have been made in this body, but as yet the walls are undefined.

LITTLE CHIEF.—The company is continuing to work in the northern end of the claim, securing some fair ore, but no new developments are reported. The sinking of the south or No. 9 shaft is also continued, and the dump shows some fair-looking contact matter, but no ore has so far been encountered.

MATCHLESS.—Operations continue without change, and a regular production is maintained. The exploration-drifts to the north and northeast of the north shaft, for a hundred feet past in seventeen-ounce siliceous ore, have lately penetrated a material carrying more iron, and the outlook for profitable ore-bodies to the north has greatly improved.

ROBERT E. LEE.—The drying and sampling-mill is kept employed continually on the ore hoisted daily from the mine. In addition to these shipments, the mine is shipping between 200 and 300 tons daily of second-class material from the dumps, accumulated during the past year. This material is sent both to stamp-mills and smelters. The dumps, before shipments were begun, contained from 12,000 to 15,000 tons of ore, estimated to contain from 15 to 30 ounces in silver to the ton.

SILVER CORD.—It is reported that the mine shut down November 15th. This is owing to the low price of lead, which greatly affects the ore of the character produced by the Silver Cord, and a disagreement with the smelters, which prevents the ore from being marketed to the best advantage. The company has decided to suspend its output until operations can be conducted more profitably

OURAY COUNTY.

CIMMARON.—The owners of this mine recently met the leading members of the Miners' Union, and proposed a compromise, agreeing to pay $2.75 per day and board. The union called a meeting and considered the matter, agreeing to accept the sum stated, provided the mine would reinstate the strikers. They also demanded other concessions. Twenty-five men went to work on the mines at from $2.50 and board up, and went to work armed. They apprehend another invasion from the strikers.

PARK COUNTY.

CHICAGO SAMPLING AND CONCENTRATING COMPANY.—This company, having purchased the Park County Sampling and Concentrating Works, located at London Junction, and having repaired the same, is now prepared to purchase good concentrating ores for cash.

SUMMIT COUNTY.

A number of mines on Gibson Hill, near Breckenridge, are working under leases and producing regularly. The Mayflower mine, in the same vicinity, is also shipping. The Gibson Hill Mining Company is working fifteen men and shipping from thirty to forty tons of ore a week. The Warrior's Mark mine, nine miles below Breckenridge, worked on a lease, is sending ore to Denver regularly. The mine looks better than ever before. The Brittle Silver Company's mill at Decatur has been started up. The Cashier mine, on Teller Mountain, in the Hall Valley District, was sold recently to an English company. The Little Chicago Mining Company has just let another contract for three hundred feet of work on its property on Sheep Mountain.

ROBINSON CONSOLIDATED.—The mine is again shipping about three cars of ore a day.

DAKOTA.

FATHER DE SMET.—The superintendent writes November 4th: I herewith inclose express company's receipt for bar No. 170, containing 1049·95 ounces of gold, the result of clean-up of mill for last half of October, making a total of 1798·65 ounces for the month. At the mine, the outlook remains about the same, no material changes having taken place to speak of. We have stopped work in Golden Gate south header, for the present, and will confine the work to opening out in ledge for a chamber, the header being far enough advanced for all purposes now. The east cross-cut, third level, has not developed any thing of much value as yet, but I feel hopeful of finding a better quality of ore in there soon. The mill is running well.

IDAHO.

MCNUTT.—This mine is on Moose Creek, in Lemhi County, and consists of a gravel bar, which is something like half a mile wide by two and a half miles in length, and embracing something more than 800 acres. This bar is twelve feet deep where it is now worked, and increases in depth as it goes up-stream. The

upper hole, where sunk to the bed-rock, is twenty-three feet deep. The deposit contains no large rocks; every thing is run off by the current through the sluices. The washing is done by two Little Giants. The ground has been thoroughly tested over the whole extent, and this prospecting has been going on for ten years past. The gold averages from 930 to 941 fine, and brings $19 per ounce. The cost of machinery and improvements up to this time exceeds $100,000. At present, the washing season lasts only through the spring and summer months; but there is ample opportunity to increase the supply of water by new reservoirs to twenty times the present amount. The cost of such a reservoir is estimated at $20,000, ample material for the same being convenient.

MAINE.

SULLIVAN.—The company is making arrangements to prospect its mine with a diamond drill.

WEST LUBEC SILVER.—This company has temporarily suspended operations in the shaft, and is preparing to lay the foundations for heavy machinery, which will be put in running order this winter.

MEXICO.

A correspondent of the Mexican *Financier* writes from Zacatecas that mining industry there, already very lively, will be given a great boom by the coming of the Mexican Central Railroad; for the mines can be much more profitably carried on than by the slovenly methods now in vogue. The difficulty in the way of working the mines has been, not only the lack of improved machinery, but also the lack of fuel for running the machinery after it had been brought here. Therefore, however much inclined to adopt progressive methods the owners of mines might be, the patio process has been clung to out of necessity.

A great deal of American machinery will be put in here when the railroad is finished; for then the road will settle the fuel problem, bringing coal down from the north at rates which will enable the profitable working of the mines under modern processes. There has already been some American machinery put in here lately, but it has been at a great expense.

There are something like 150 mines in this district, and the output last year was $6,000,000 in silver. The profit, under the expensive patio process, is much curtailed as compared with modern methods, and from the rich character of the ore it may be anticipated that there will be a great demand for American machinery as soon as it is attainable.

The ore is chiefly black sulphurets. Gold is so seldom encountered that it is hardly worth while reckoning it as a product here. Virgin silver is very common in the ore. The ore grows richer as it goes down, but 1200 feet is about the greatest depth that has been attained, owing to the difficulty of pumping by the crude prevailing methods, and on this account many mines have been abandoned at a much less depth than that. Some mines here now yield very high, but the average is about 75 ounces.

MICHIGAN.

The men at the Ludington mine joined the Chapin mine strikers at Iron Mountain November 17th, and, with a brass band, paraded the streets from 800 to 1000 strong. Four hundred of them then surrounded Superintendent Stockbridge, of the Ludington mine, and, upon his refusal to yield to their demands, attacked, kicked, and beat him until he promised them any thing they wanted. The mob then started in search of Superintendent Cody, of the Chapin mine, but he had started for Milwaukee. The men threaten that, unless their demands are conceded, they will compel the stoppage of the pumps at the Chapin mines, and allow them to be flooded. Later reports have not yet been received.

A dispatch to the Boston *Herald* states that the shipments of iron ore from the Menominee and Marquette districts during the week ended November 19th show a still further falling off, compared with the same time last year. The shipments for the week from four lake ports aggregate only a trifle over 38,000 tons, against over 68,000 tons last year, a decrease of about 30,000 tons. The total for the year is very much less than for 1882. The record for this season to date is as follows: Escanaba, for both Marquette and Menominee districts, 1,385,080 tons; Marquette, 682,523 tons; l'Anse, 64,804 tons; and St. Ignace, 55,851 tons—the last three ports shipping for the Marquette District; total, 2,188,313 tons. The total for 1882 to this date was 2,751,226 tons, showing a decrease this season thus far of 562,913 tons. Earlier in the season, it was predicted by many that shipments would increase as the year advanced, and the most sanguine prophets estimated that the total shipments would equal those of last year; but the rate of decrease has grown greater as the season advanced, and the falling off now is greater than at any time before. The extremely cold weather last week led to the belief that the season would close early, and on all sides active work is almost at a stand-still. In most mines, only a small force of men is now employed. At many mines, the work of forwarding ore has ceased for the year. The largest amount shipped from any one mine during the year has been from the Chapin, the output from that mine being over 262,000 tons to date. Next come the Republic, Lake Superior, Champion, and Cleveland, in the order named. Chapin, however, shows a record far ahead of any other. The output of the Republic is about 151,500 tons. The superiority of Chapin's business is believed to rest largely in the fact that the royalty paid there is only 40 per cent, while the average of other mines is over 50 per cent, in some cases being as high as 65 and 70 per cent. At the royalty paid the owner in fee of Chapin, even at the comparatively low rate quoted, the amount so paid will be $108,000 for the season, placing Chapin's output at 270,000 gross tons, which it will probably be. This question of royalties will play an important part in the calculations of operations for the coming year, especially if the present depression in the iron trade continues.

ASHLAND MINING AND EXPLORING COMPANY.—This newly organized company has been at work for several weeks on section 27, town 47, range 47. Ore was recently struck, and a shaft has been sunk to a depth of 10 feet in clean blue hematite of most excellent quality. The extent of the vein has not yet been fully determined.

IRON HILL.—It is stated that work will be resumed soon.

MAY.—A pump and boiler will be placed on this company's property, when explorations will be pushed vigorously. Several test pits put down on the tract show a fair quality of hematite ore. A shaft some 20 feet in depth has been sunk.

PEWABIC.—Developments are watched with interest, owing to a slight improvement underground in the mine.

SAGINAW.—This company has a diamond drill exploring its property adjacent to the Perkins mine. Nothing of value has yet been reached.

VULCAN.—Only a small force of men is now employed. During the winter, the mine will be put in shape for rapid and economical production.

MONTANA.

DEER LODGE COUNTY.

GRANITE MOUNTAIN—On the 31st of October, the company shipped 72 bars of bullion, valued at $157,573. This was the product of 1434 tons of ore. As this was worked in a leased mill, it may be that the company will not be able to have any more milled for several months.

MEAGHER COUNTY.

CLENDENNIN MINING AND SMELTING COMPANY.—One furnace is at work, turning out daily from 150 to 175 bars of silver bullion, mostly from the Silver Bell mine.

MAGINNIS.—The amount of ore worked in October from the Hauser and Holter mines was 330 tons; amount of gold saved, 493 ounces; net value, $8756.75. The average assay value of tailings is $61 in gold and seven ounces in silver per ton—total value in 330 tons, $31,190. Total expense for mining and milling, $4.06 per ton. Owing to the great loss in tailings, the mill has been closed down with the intention of introducing pans in the spring.

SILVER BOW COUNTY.

MOUNTAIN VIEW.—It is said that this mine is an extension of the Anaconda. A shaft has been sunk 500 feet deep, and a fine grade of copper ore in the south 300-foot cross-cut has been struck. A north vein has also been in tersected, and with a little more exploration, the extraction of ore on a large and profitable scale will begin.

NEVADA.

ELKO COUNTY.

BELMONT.—Winze No. 1, 55 feet north of face, is down 25 feet and yielding splendid black metal and chlorides. All stopes in south tunnel and Laity ground are yielding first-class ore, some of which assays very high; the mill is doing splendid work; chlorinations average 91 per cent.

GRAND PRIZE.—The mill has started and is working well. Pulp assays, so far, have averaged $224 per ton.

NAVAJO.—The mill is ready to start as soon as work of the drain-pipe through the North Belle Isle is completed.

EUREKA COUNTY.

MERRIFIELD.—This mine, after producing heavily for several years, was closed down last August, and has passed into the control of a New York corporation. All claims against the old management have been settled in full.

STOREY COUNTY.

The following is the report of County Assessor, showing the proceeds of the mines of this county, as they appear on the assessment-roll for the quarter ended September 30th, 1883:

Mine or company.	Ore extracted. Tons.	Value per ton.	Gross value or yield.	Total cost.	Net yield.
Belcher	1,400	$20.00	$29,150.11	$26,828.45	$5,830.02
Crown Point	3,985	13.00	55,309.33	53,511.19	11,061.86
Challenge	374	13.00	5,161.20	7,106.00	1,032.24
Consolidated Imperial	123	13.00	1,704.30	2,346.50	340.86
Kentuck	2,569	22.00	58,018.69	48,811.00	11,603.73
Ophir	773	16.00	12,063.44	27,637.72	2,412.68
Potosi	2,597	12.14	31,552.06	30,253.64	6,310.40
Yellow Jacket	3,325	14.00	46,983.64	75,900.35	9,396.72
					$47,998.52
Lady Bryan	143	$7.00	$1,001.00	$1,072.50	$100.10
Monte Cristo	319	12.69	4,048.31	4,048.31	809.66
Lady Bryan	600	5.00	3,000.00	2,850.00	300.00
					$1,209.76
B. Pfeifer's tailings mill	369	$2.00	$738.00	$738.00	$73.80

ALPHA AND EXCHEQUER.—The work at these mines is prosecuted very economically. During the month of October, the total expense of the two mines was $3400, including wages, salaries, and supplies. The joint west drift from the Imperial shaft on the 600 level has been extended a total distance of 150 feet. It will be run to the west wall, and is expected to cut through a promising body of quartz in its progress.

BEST & BELCHER AND CURRY.—A change of material has occurred in the joint Best & Belcher and Curry winze, below the 2550 level. It is a black, decomposed matter, which looks like slag from a furnace, and contains much base metal, principally iron. They are putting in machinery at the Banner shaft preparatory to resuming work on the 1200 in the Gould & Curry, and are now at work in four different places in Curry.

NEW HAMPSHIRE.

WARREN.—A number of experiments are making in smelting the ore by the vapor fuel process. The ore runs from 35 to 40 per cent zinc, 8 to 10 ounces silver, shows a trace of gold, 11 per cent lead, and about 35 per cent of sulphur. The vein is a true fissure, and is from 4 to 30 feet thick, and has been traced upon the property for a distance of more than 6000 feet. Some 8000 tons of ore are in sight. Two shafts have been sunk, and every thing is in readiness for taking out the ore. A large amount of private capital has been used in putting the property upon its present paying basis.

NEW MEXICO.

GRANT COUNTY.

BONNIE JEAN.—The shaft is down 273 feet and the outlook is very favorable. Sixty-five feet of cross-cutting at the 200-foot level shows up four distinct veins or spurs, running in copper, silver, and gold to the value of $61 per ton. This was above the water-level, which was struck at the depth of 270 feet. A fifty horse-power engine, with hoisting machinery complete, has been purchased and shipped to Shakspeare.

IVANHOE.—The reverberatory furnace has blown in lately and is running satisfactorily. There is enough ore on hand to keep the furnace running all winter. However, a force of men will be kept at work on the mine, taking out ore to fill the contract with the Deming smelter.

CINCINNATI.—This mine has a good pay-streak of silver ore, from which it is taking out about two car-loads per week and shipping to Pueblo and receiving profitable returns.

UTAH.

EMERY COUNTY.

The ore of this new mining district near Cedar Mountain is said to be found in sandstone similar to that of Silver Reef. Ore is said to be abundant, and wood and water plentiful. The country is reported mild and excellent for winter work.

SALT LAKE COUNTY.

TRUE FISSURE.—At this mine, a large body of ore is developing with satisfactory results.

VALLEJO.—The recent strike in this mine is the largest made in Alta for several years past. The ore assays 130 ounces silver, and there are about 200 tons ready for shipment.

SUMMIT COUNTY.

CRESCENT.—At the recent meeting, the following directors were elected: President, E. P. Ferry; Vice-President, J. J. Daly; Treasurer, W. S. McCornick; Secretary, C. H. Withey. The report presented shows receipts from ore sales $348,000. Expenditures: Dividends, $150,000; purchase of Walker & Webster, $50,000; permanent improvements and property on hand, $148,000; total, $348,000. The "property on hand" item includes supplies for the mine sufficient to last until July 1st, 1884.

ONTARIO.—The shaft at the No. 3 has reached a depth of 855 feet, and the work of cutting the stations is to be commenced at once. Burleigh drills are to be used to hurry forward the work. These stations are deeper by about twenty feet than the 800 in No. 2, and when completed a tunnel will be run to carry the water from No. 2 to the tank station of No. 3, from which place it will be thrown to the 600 tunnel by the Cornish pumping-engine. Ore is mined at the 600 station of No. 3, and shipped to the mill. At No. 2, preparations are carried forward to cut the vein at the 900 level, which will be 100 feet deeper than the lowest workings in the mine at the present time. It is calculated that the cross-cut from this station will cut the vein in about sixty feet.

FINANCIAL.

Gold and Silver Stocks.

NEW YORK, Friday Evening, Nov. 23.

Business was better and more generally distributed in the mining market this week, and especially was this noticeable in the dividend-paying stocks. Chrysolite formed the chief interest in the market, and was very actively dealt in. It was quite strong at one time, but declined to-day. It is the belief that the advance is to create a "short" interest, as there are no new important developments from the mine. Green Mountain developed considerable strength under moderate dealings. The reports from this property seem to be favorable. Some of the low-priced or fancy stocks foot up a large total in dealings, but they suffered no material change in price. A full summary of the market is given below. The total number of shares sold aggregates 181,738, as against 121,565 last year.

The Comstock shares were very quiet at steady prices. California sold at 25c. Consolidated Virginia was irregular, under a fair business, selling from 45@39@40c. Sierra Nevada was quiet and steady at $3.25. Union Consolidated was weak, declining from $3.70@$3.10 under a small business. Mexican was strong, selling from $2.65 $3@$2.80. Ophir sold at $6. Sutro Tunnel was moderately dealt in at steady prices; it sold from 14@16@15c.

The Leadville stocks were quite strong, and were very actively dealt in. Amie was active and steady, selling from 14@13c. Chrysolite was quite strong under a very active business; it sold from $1.30@$1.70@$1.45. There has been no rich and important strike made in the Marsden shaft, as was currently reported, and an officer of the company states that there have been no new developments made in the mine. Dunkin was quiet at 20c., and Breece sold at 14c. Iron Silver was actively dealt in at irregular prices, selling from $2.40@$2.30. The bullion product from this mine for the month of October amounted to $110,000, and the profit for the month, $21,000. The company states that it will pay its usual dividend next month although the showing for October is not so good as the preceding month. They state, however, that they have ample funds on hand for that purpose. Leadville was weak, under a small business, selling from 55@45c. Little Chief was steady under small transactions, selling from 54@58@55c. Little Pittsburg was quiet and irregular, selling from 55@50@51c. Climax sold from 6@9c., and was actively dealt in.

The Bodie stocks were quiet and steady. Bodie Consolidated sold at 50c. Standard was quiet and steady, selling from $6.25@$6.50@$6.38. Bulwer was weak, under a small business, selling from 49@40c. North Standard sold at 13c.

The Tuscarora stocks were moderately dealt in at steady prices. Grand Prize sold from 33@30c. Belle Isle was quiet and steady at 34@30c. Navajo sold at $4 under a small business. North Belle Isle was quiet and steady, selling from 55@50c. Independence sold at 20c. Elko Consolidated was steady under a small business, selling from 19@18c.

In the miscellaneous list, Eureka Consolidated was irregular, selling from $4@$3.50@$3.75 under a small business. Green Mountain was quite strong, under a small business, selling from $1@$1.20; it is reported that the advance in this stock is owing to reports from the mine that the tunnel is making a progress of eight feet a day, and is rapidly nearing the famous Blake chute. It is also said that the company made a small profit last month. Homestake sold from $9@$8.75@$10, with small transactions. Horn-Silver was strong, under a fair business, selling from $6@$6.63@$6.50. Ontario was weak, selling from $30@$29; the transactions were small. Robinson Consolidated was quiet and weak, selling from 41@36c. Sierra Grande was also weak, under a small business, selling from $1.10@90c. Silver King was strong at $7.

Barcelona was quiet and steady, selling from 22@25c. Caledonia showed a little weakness, declining from 25@20c. under a small business. Central Arizona was quiet and steady, selling from 17@24c. Decatur sold at 5c., with a very active business. Eastern Oregon was very active at steady prices; it sold from 43@45c. Harlem was strong, under a small business, selling from 99c.@$1.10. Lacrosse was considerably dealt in at weak prices, selling from 10@7c. Oriental & Miller was quiet, and sold from 2@6c. Red Elephant sold at 6c. under a small business. Sonora Consolidated was very actively dealt in at steady prices; it sold from 28@25c. North Mexican was listed on the Exchange this week, and was quite strong at 65c. at one time; it declined to-day, however, to 30c., but reacted and closed at 55c. The property of this company is situated in the Magdalena District, Sonora, Mexico, and consists of three developed mines and a two-stamp mill. The company proposes to add six more stamps, which are now on the way to the mines. It is said that the company has expended about $45,000 in developing the property alone. The mines are within ten miles of the Sonora Railroad.

The New York Mining Stock and National Petroleum Exchange and the Exchange for Unlisted Securities have consolidated, the members of the latter Exchange paying $200 for membership in addition to $40 *pro rata* on life insurance fund.

DIVIDENDS.

The Ontario Silver Mining Company, of Utah, has reached the eighty-ninth dividend ($75,000 for October), and aggregating a total paid of $5,075,000. The present dividend is payable at the office of transfer-agents, Lounsbery & Haggin, No. 15 Broad street, on November 30th. Transfers close on the 24th.

The Plumas-Eureka Gold Mining Company, of California, paid a dividend of 50 cents a share, in London, on the 12th ult., aggregating $20,312.50. Total of dividends this year, $40,625.

The Sierra Buttes Gold Mining Company, of California, paid a dividend in London on the 12th ult., of 25 cents a share, aggregating $5625. Total of dividends this year, $11,250.

PIPE LINE CERTIFICATES.

Messrs. Watson & Gibson, petroleum brokers, No. 49 Broadway, report as follows for the week:

The advance in prices two weeks ago from $1.10@$1.19 has been pretty well sustained, the lowest price on the reaction being $1.15¾. On Thursday, amid great excitement, the price was advanced from $1.17⅜, the opening, to $1.19⅜ in New York, and $1.20 in Oil City.

The range of fluctuations during the week has thus been from $1.15¾@$1.19⅜. To-day (Friday) the opening was $1.19⅜, but the market shaded off to $1.18¼, but rallied a little and closed at $1.18¾.

The general tone is decidedly bullish on the decreasing stocks of oil and diminishing production. The bulls freely predict $1.25@$1.30 oil, and claim that the Standard is inclined to advance Refined, which is now 9c., strongly bid, and that it will exercise a very bullish influence on crude; that if, last fall a year ago, prices were put to $1.36, and the past summer to $1.24½, the situation now warrants still higher prices.

The following table gives the quotations and sales at the New York Mining Stock and National Petroleum Exchange:

	Opening.	Highest.	Lowest.	Closing.	Sales.
Nov. 17	$1.17	$1.17⅝	$1.16⅜	$1.17	6,619,000
19	1.17	1.17	1.15¾	1.15⅞	7,226,000
20	1.15¾	1.18¼	1.15¾	1.18⅛	6,645,000
21	1.18¼	1.19	1.17¼	1.17⅜	8,132,000
22	1.17⅜	1.19¾	1.17⅜	1.19¼	8,697,000
23	1.19⅛	1.19¼	1.18⅛	1.18¾	6,219,000
Total sales					43,808,000

Copper and Silver Stocks.

Reported by C. H. Smith, 15 Congress street, Boston, Stock Broker and Member of the Boston Mining and Stock Exchanges.

BOSTON, Nov. 22, 1883.

The market for copper stocks the past week has ruled extremely dull, but at the same time there is a good degree of firmness to prices, which gives encouragement for a better time coming. There are but few stocks offered for sale at present prices, and, should an active demand set in, we look for a considerable advance, especially on the dividend-paying shares. Calumet & Hecla dropped one point on the early dealings to $237, but quickly recovered and is now steady and in good demand at $238. Franklin advanced from $11⅛@$11¾ on sales of 50 shares. A dividend of $2 per share is talked of as probable some time next month. Quincy sold at $52, same as last week. Atlantic sold at $10; last sale $10¼, September 11th. Nothing doing in the rest of the list.

In silver stocks, there is a firmer tone, and better demand for good stocks. Catalpa advanced from 30@37½c. Crescent sold at 20c. Bowman Silver has been active, and, on good reports from the mine, advanced from 11@20c., with a reaction to 17c. The stock is well held, and higher prices are predicted. Massachusetts & New Mexico sold at 2c. Dunkin, sales at 26@28c., same as last week. Sullivan sold at 94c., closing 90c. bid.

3 P.M.—There was no material change in the market this afternoon. Prices continue firm. Sullivan sold at ⅜. Catalpa, ⅝ bid. Calumet & Hecla, $238; sales closing $237 bid, $239 asked. Quincy, $50 bid, $52 asked. Pewabic, $3½ bid, $4 asked. Atlantic, offered at $11 Osceola, offered at $19, no bid. Silver Islet, $3 bid, $4 asked.

SAN FRANCISCO MINING STOCK QUOTATIONS.

Daily Range of Prices for the Week.

NAME OF COMPANY.	CLOSING QUOTATIONS. Nov. 16.	Nov. 17.	Nov. 19.	Nov. 20.	Nov. 21.	Nov. 22.
Albion	...	...	...	...	...	...
Alpha	1⅜	...	...	...	1⅛	1
Alta	1¼	1¼	2¼	...	1⅛	...
Argenta	.10	...	...	...	...	...
Bechtel	...	...	...	...	...	...
Belcher	...	...	...	...	.05	.80
Belle Isle	.35	...	...	...	35	...
Best & Belcher	3⅜	3⅜	3¼	...	3⅛	3
Bodie	.50	.35	.40	...	.50	.45
Bullion	...	...	...	...	...	...
Bulwer	...	...	...	...	...	...
California	.25	.30	.25	...	.25	.25
Challar	2	2	2	...	2	1⅞
Con. Virginia	.40	.45	.40	...	.40	.40
Crown Point	...	.95	.85	...	1	.85
Elko Cons	...	...	...	...	.20	.20
Eureka Cons	...	...	...	...	4	...
Exchequer	...	...	...	...	...	...
Gould & Curry	1½	1⅝	1½	...	1½	1¼
Grand Prize	.35	...	...	...	.35	.30
Hale & Norcross	1⅝	...	...	...	1½	1⅜
Independence	...	...	...	...	...	...
Martin White	...	...	...	...	...	...
Mexican	2¾	2⅞	3⅞	...	2½	2⅝
Mono	...	...	...	...	...	...
Mount Diablo	3	3	3¼	...	3¾	...
Navajo	3¾	...	...	...	3⅞	3⅞
Northern Belle	4¼	4¼	3⅞	...	4	4½
North Belle Isle	...	...	...	...	...	...
Ophir	5	5	5½	...	5⅞	5¾
Overman	...	...	...	...	...	...
Potosi	60	.60	.65	...	.60	.60
Savage	60	.60	.60	...	.50	.50
Scorpion	.50	...	...	...	...	...
Sierra Nevada	3⅝	3⅝	3⅜	...	3½	2⅞
Silver King	...	...	...	...	...	...
Tip Top	...	...	...	...	...	...
Union Cons	3¾	3¾	3¾	...	3⅜	3¼
Utah	2¼	2¼	2⅜	...	2¼	2¼
Wales Cons	...	...	...	...	...	...
Yellow Jacket	2⅞	2⅞	2¾	...	2¾	2¾

BULLION MARKET.

NEW YORK, Friday Evening, Nov. 23.

As foreshadowed in our last week's postings, the silver market has declined, and may be reported as still weak under the lower rates of exchange on India, and is likely to recede still farther.

DATE.	London. Pence.	N. Y. Cents.	DATE.	London. Pence.	N. Y. Cents.
Nov. 17	50 11-16	110⅜	Nov. 21	50½	110
19	50⅝	*	22	50 9-16	110
20	50⅝	110¼	2:	50½	110

* 110¼@110⅜.

Bullion Receipts at New York.—The bullion received from the mines at the various offices in this city during the week ended November 23d, as compiled from various sources, amounted to $161,000, as against $257,000 reported for the previous week. The receipts from January 1st, 1883, to date are $10,316,443.

Exports and Imports of Gold and Silver at New York.

Exports.

Week ended November 17th	$30,750
Corresponding week last year	54,400
Since January 1st, 1883	12,980,109
Corresponding period last year	44,668,621

Imports.

Week ended November 17th	$1,442,751
Corresponding week last year	457,166
Since January 1st, 1883	18,900,413
Corresponding period last year	5,485 335

Foreign Bank Statements.—The governors of the Bank of England, at their weekly meeting, made no change in the bank's minimum rate for discount, and it remains at three per cent. During the week, the bank lost £21,000 bullion, but its proportion of reserve to its liabilities was unchanged at 42 11/16 per cent, against 40⅝ per cent at this date last year. November 22d, the bank lost $193,000 bullion on balance. The weekly statement of the Bank of France shows an increase of 525,000 francs in gold and a loss of 1,475,000 francs in silver.

Silver for Dimes.—A special purchase of 50,000 ounces of silver bullion has been made by the Treasury Department. It is to be used in coining a sufficient number of dimes to supply an unusual demand for that coin on the Philadelphia Mint.

BULLION PRODUCTION FOR 1883.

MINES.	States.	Month of October.	Year from Jan. 1st, 1883.
*Alice, G. S.	Mont..	.....	$779,099
*Alta-Montana, G. L. S.	"	.....	$10,625
*Belmont.	"	.....	12,604
Bodie, G. S.	Cal....	10,199	199,859
Bodie Tunnel, G.	"	.....	52,742
*Bonanza King, G.	"	.....	426,967
*Boston & Montana, G.	Mont...	2,908	138,015
*Central Arizona, S.	Ariz..	.....	35,845
*Christy, S.	Utah..	17,744	219,459
*Chrysolite, S. L.	Colo....	16,238	327,779
*Consolidated Bobtail, G.	Colo...	6,996	54,982
*Contention, S.	Ariz...	.....	714,637
*Crescent, G. S. L.	Utah...	40,820	266,498
*Custer, G. S.	Idaho..	.....	43,572
*Deadwood-Terra, G.	Dak...	52,922	388,562
*Derbec Blue Gravel, G. S.	Cal ...	12,464	115,043
Dunkin, S. L.	Colo....	6,291	49,250
Evening Star, S. L.	Colo...	.....	47,061
*Father de Smet, G.	Dak....	29,805	300,681
*Frisco M. and S. Co., G. S. L.	Utah..	.....	877,084
*Granite Mountain, S.	Mont...	157,573	323,523
Gunnell, S.	Colo...	.....	58,828
*Haile, G., S. & C.	S. C....	.....	27,900
*Head Center Consolidated.	Ariz..	.....	43,247
*Head Center and Tranquillity	Ariz..	.....	89,108
*Hecla Consolidated, G. S. L.	Mont..	.....	633,979
*Homestake, G.	Dak. ..	99,113	866,709
*Hope, S.	Mont...	.....	82,060
Horn-Silver, S. L.	Utah...	263,000	2,737,200
*Howell S. and Mg. Co., G. S. L.	Ariz....	30,588	144,877
Idaho, G.	Cal	.....	150,642
*Independence, G. S.	Nev....	.....	32,991
*Iron Silver S. L.	Colo...	.....	1,031,952
*Jocui Ita. S.	Mex...	.....	‡258,959
*Kentuck, G. S.	Nev	.....	18,596
*Lexington, S.	Mont...	86,843	1,054,551
*Little Pittsburg, S. L.	Colo....	7,133	72,111
*Marguerite, G.	Cal	.....	68,794
*Martin White, G. S.	Nev....	.....	136,317
Morning Star, S. D.	Colo...	.....	84,428
Mount Diablo.	Nev....	47,108	428,250
*Navajo, G. S.	"	.....	411,642
*North Belle Isle.	"	.....	2,153
Northern Belle, S.	"	23,278	539,105
*Ontario, S. L.	Utah...	211,800	1,807,178
*Oxford, G.	N. S....	3,880	54,055
*Phœnix, G.	N. C....	.....	21,009
*Pinal Consolidated, S. L.	Ariz	.....	181,485
*Plymouth Consolidated, G.	Cal ...	17,008	373,090
*Sateno, G.	N. S....	.....	2,500
*Silver Bow, G. S.	Mont...	.....	203,947
*Silver Cord, G. S. L.	Colo....	.....	703,333
Silver King, S.	Ariz...	.....	367,802
*South Yuba, G.	Cal	.....	37,272
Standard, G.	Cal	88,397	963,619
Star, S.	Nev....	.....	27,095
*Stormont, S.	Utah ..	21,761	215,552
Syndicate, G.	Cal	.....	56,008
Tintic M. and M. Co.	Utah...	.....	34,670
*Tip Top, S.	Ariz....	.....	37,868
*Tombstone, G. S. L.	"	59,057	664,618
Wyoming Consolidated.	Cal	.....	31,541
Yellow Jacket, S.	Nev....	.....	265,885
Total amount of shipments to date.			$19,604,804

* Official. † Net value. ‡ Assay value. § Not including value of lead. *G. Gold. S. Silver. L. Lead.* The dash (——) indicates that no shipments have been made in the month named. ** Silver valued at $1.10 per ounce.

METALS.

NEW YORK, Friday Evening, Nov. 23.

Copper.—The market has been very quiet during the week. The Lake companies are not sellers, there is very little copper offering by outsiders, and the demand is moderate. We quote nominally 15c. for Lake, and 14⅛@14¼c., according to brand, for other kinds. The latest cable for Chili Bars is £59 7s. 6d.

The following are the Board of Trade returns, just received, for the first ten months of the current year, the figures printed last week having been for the first nine months:

	Jan. 1 to Oct. 31. 1883.	1882.
Imports:	Tons.	Tons.
Pure in pyrites	12,814	13,161
precipitate	18,465	14,706
ore	13,444	13,045
regulus	7,823	7,193
Bars, cakes, etc.	29,698	29,510
	82,244	77,615
Exports:		
Raw (English)	14,000	10,525
Sheets	12,965	13,569
Yellow metal at 60 per cent.	10,008	9,285
Brass at 70 per cent.	2,842	2,825
	39,815	36,204
Foreign	9,633	10,814
	49,448	47,018

Tin.—Under a good deal of trading, this metal has weakened further, and is now quoted 19¼c. for spot Straits, cash. This afternoon, London broke to £86 10s. for spot, according to a dispatch received at the Metal Exchange.

Lead.—In the middle of the week, the agent of one of the Western refiners took 1000 tons of Pueblo at 3·70c., and since then a few hundred tons have been sold at that figure. Buyers are too much frightened at the recent rapid decline to show any confidence in the metal, so that some of them who might be induced to take hold if they considered the metal low are holding off, and it would probably be difficult even to place any round lots at more than 3·65c. for Common, so far as the manufacturing trade is concerned. We are approaching a dull season, and there is not much encouragement in the early future for the metal.

Messrs. John Wahl & Co., of St. Louis, wire us as follows to-day:

The price is declining, there being more sellers than buyers in the market. Sales during the week foot up to 150 tons of Refined at 3·60c., and 300 tons of ordinary Missouri at 3.50c. Refined will not bring over 3 50c. now.

Messrs. Everett & Post, of Chicago, telegraph us to-day:

Our market has declined slowly since our last report on sales of 110 tons at 3·45c. It closed somewhat better, with sales of 500 tons at 3·47½c.; and though some sellers still ask 3·45c., buyers are shy about anticipating their wants.

Spelter.—There is nothing new to report. Common Western is dull at nominally 4⅝@4½c., with Silesian at 5⅛c. asked.

Antimony.—This metal is stiffer to-day. We quote at the close, 9¾c. for Hallett's and 10½c. for Cookson's.

IRON MARKET REVIEW.

NEW YORK, Friday Evening, Nov. 23.

The following figures, taken from the report of the British Board of Trade, show the exports of iron and steel from Great Britain to this country during the first ten months of this and preceding years:

	1881.	1882.	1883.
Pig-iron	347,242	422,863	245,742
Old iron for remanufacture.	74,594	77,002	41,576
Steel unwrought	103,350	122,453	26,471
Tin plates	146,611	182,815	184,251
Hoops and sheets	30,753	31,875	27,538
Bar, angle, bolt, and rod	11,521	18,076	8,064

American Pig.—We print elsewhere an abstract of Mr. Swank's statistics of stock and of the condition of the furnaces, which is encouraging as far as it goes. Briefly, it shows that stocks have fallen off a little, and that the number of furnaces in blast is less. On the other hand, it must not be forgotten that from July to November is the busiest part of the year in many branches, and that though the demand was disappointingly small this year, it is likely to be still less during the next months. This explains the apathy of buyers, and should not be forgotten by producers, or cause any undue rejoicing over Mr. Swank's figures. They will not do for a "bull" argument, but, on the other hand, they do not leave any opening for a "bear" attack. The market for Foundry irons is quiet and dull. We quote Foundry No. 1, $20@$22.50; No. 2, $18.50@$19; and Gray Forge, $17@$18.50, all at tide-water. There has been some business in Bessemer Pig, which we quote $20 @$20.50. Spiegel is quiet at $30.50@$31.

At the Exchange, the following transactions were reported during the week: Saturday, 100 tons No. 1, December, $20; Monday, 100 tons No. 1, March, $20.50; Tuesday, 200 tons No. 1, February, $20.50; 200 do., March, $20.50; 200 do., April, $20.50; Wednesday, 100 tons American Pig, No. 1, March, $20.50; Thursday, 100 tons No. 1, December, $20; 500 do., March, $20.50; 100 do., April, $20.50; 200 do., February, $20.50; 200 do., March, $20.50; 200 do., April, $20⅝; 200 do., May, $20⅝.

Scotch Pig.—The market is dull and depressed, and in spite of the fact that arrivals are moderate, some of the iron goes into store.

We quote ex ship and to arrive: Coltness, $23; Langloan, $23@$23.25; Summerlee, $22.50@$23; Eglinton, $20@$21; Glengarnock, $21.75@$22; Dalmellington, $20@$21.

At the Exchange, the following cable quotations were received to-day: Coltness, 55s.; Langloan, 55s.; Summerlee, 54s. 6d.; Gartsherrie, 52s. 6d.; Glengarnock, at Ardrossan, 52s. 6d.; and Eglinton, at Ardrossan, 46s. 6d. Warrants at the Exchange to-day were 44s. 8d.

Rails.—Business has been confined to the sale of a number of small lots, aggregating probably between 15,000 and 20,000 tons, varying according to time and locality of delivery between $35 and $36.

Old Rails.—Business has been dull. We quote $22.50@$23.

Philadelphia. November 23.

Pig-Iron.—Since Monday morning, a large amount of Gray Forge has been sold, for delivery after January 1st. The average price has been $18. Brokers and representatives of companies here are more confident this week than for two or three months, not of any improvement in price, but of a sufficient demand to absorb all stocks as produced. The decline in producing capacity has gone as far as is necessary, and the corner has been turned by the presentation of requirements which have been withheld all the fall. Forge iron has sold in 500 to 1000-ton lots, and to-day negotiations are pending for 1000-ton lots, which brokers expect to close by Saturday. The outlook is quite encouraging, as far as mill irons are concerned. Standard brands are in better request; that is to say, consumers are coming forward and paying prices which have been asked for a month past. There is still a good deal of inferior iron offered, but it is less troublesome than a few weeks ago. In short, there has been a great deal of quiet purchasing for future requirements. Nothing encouraging can be said of foundry iron. Quotations are, $20@$21 for No. 1, and $18.50@$20 for No. 2. Most of this week's business has been in 25 to 100-ton lots, at $19 and $20.50 respectively.

Foreign Irons.—Movements in foreign irons have practically ceased. Nominal quotations are $20@ $20.50 for Bessemer, and $29.50@$30.50 for Spiegeleisen. Two or three brokers have been selling a few hundred tons of Scotch at all kinds of prices. Supplies here are very light, and there is very little disposition to order for shipment.

Muck Bars.—Business in muck bars is of very small proportions. A number of contracts have been completed, and no new ones are placing. A few sales of small lots have been made at $33.50. Better makes are held at $34@$34.50.

Merchant Iron.—The local manufacturers held a meeting here on last Monday, and reduced the card rate to 2·10c. At the meeting, the opinion was expressed that trade was very dull. Few large orders are coming along; a comparatively small amount of iron is selling above 2c.; the better makes have been sold at this figure; 1·90c. has been taken for some good iron, and there are negotiations pending which will, no doubt, be taken at that price. There is still some competition from the West, and Eastern makers have no recourse but to follow it as far as they can.

Nails.—Nails have weakened, on account of the sharp competition of new mills, which are pushing their product upon the market. Jobbing demand is irregular, and there is less disposition on the part of consumers to buy far ahead, owing to the great excess of capacity. Nominal quotations, $2.80@ $2.90.

Plate and Tank Iron.—The lowest sales of Plate Iron have been at 2·25c.; 2·50c. is the nominal quotation for small lots, and there is a moderate amount of business done at that figure. Shell is nominally 2@ 3·25c.; and Flange, 4@4·25c. The demand is not very active, and consumers are providing merely for pressing requirements; but there is no great falling off in work.

Sheet-Iron.—Eastern Pennsylvania sheet-iron manufacturers report the demand for thin sheets fair, considering the season. Galvanized is less active, and, where large orders are to be had, concessions are heavier than at any time during the fall, as makers are very anxious to secure a winter's work.

Wrought Pipes and Tubes.—Quotations, 70 and 10 @75 per cent off list for gas and steam pipe, and 60 @62½ for tubes.

Structural Iron.—To-day's quotations are 2·40@ 2·50c. for Angles; 2·75@3c. for Tees; and 3·40@ 3·50c. for Beams and Channels. Prospects are favorable for the placing of orders for several thousand tons of bridge iron.

Steel Rails.—Quotations are $35 for late and $36 @$37 for early deliveries, with considerable negotiations in hand. The closing down of two mills, and the intended closing of two more, will, by the 1st of December, restrict the capacity 72 tons per turn, out of a total of 269 tons per turn, or a little over 25 per cent of the output. This will help the steel rail market materially, especially if it should be supple-

NEW YORK MINING STOCKS.

DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Nov. 17.		Nov. 19.		Nov. 20.		Nov. 21.		Nov. 22.		Nov. 23.		SALES.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Alice, Mon.													
Amie Con., Co.	.14	.13	.14	.13	.14		.14				.13		8,000
Argenta, Ne.													
Bar & Walker, Ut.													
Bassick, Co.													
Belle Isle, Ne.			.34		.30								600
Bodie Cons., Ca.	.50												50
Breece, Co.			.14										500
Bulwer, Ca.									.49		.40		250
California, Ne.			.25										200
Cal. & Hecla, Mich.													
Carbonate Hill													
Caribou Con., Co.													
Castle Creek					1.10	1.05	1.15		1.00				700
Chrysolite, Co.	1.30		1.30		1.60	1.35	1.55	1.45	1.70	1.50	1.60	1.45	22,550
Cons. Va. Ne.	.44	.40	.45		.42				.43		.42	.39	5,100
Crown Point													
Deadwood-Terra, Dk.													
Dunkin, Co.					.20								50
Eureka Cons., Ne.	4.00	3.75	3.50		3.85		3.95		3.75				500
Excelsior, Ca.													
Father de Smet, Dk.													
Findley, Ga.													
Gold Stripe, Ca					.05								600
Gould & Curry, Ne.													
Grand Prize, Ne.							.33	.30					300
Great Eastern, Dk.			.01										1,000
Green Mountain, Ca.	1.00				1.00		1.20	1.15	1.20		1.20		1,700
Hale & Norcross, Ne.													
Hall-Anderson, N. S.													
Hibernia, Co.													
Homestake, Dk.			9.00	8.75					10.00				225
Horn-Silver, Ut.	6.13		6.00		6 63	6.50	6.50	6.25	6.00		6 65	6.25	3,500
Hukill, Co.													
Independence, Ne.			.20		.21								2,500
Iron Silver, Co.	2.45	2.20	2.40	2.35	2.40		2.40	2.35	2.40	2.35	2.55	2.30	8,290
La Plata, Co.													
Leadville C., Co.					.55	.50	.45		.49	.47	.45		2,825
Little Chief, Co.			.54		.54		.55		.55		.58	.55	2,200
Little Pittsburg, Co.			.50		.55	.50	.52				.51		1,100
Martin White, Ne.													
Moose, Co.													
Navajo, Ne.					4.00				4.00				150
Northern Belle, Ne.							4 00		4.00				225
North Belle Isle, Ne.							.55	.50			.50		600
Ontario, Ut.	30.00				29.50		29.00						505
Opair, Ne.							6.00						100
Plumas, Ca.													
Prussian, Colo.													
Quicksilver Pref., Ca.	33.00												100
" Com., Ca.													
Rising Sun, Ca.													
Robinson Cons., Co.	.40		.40		.41		.37		.39		.38	.36	3,200
Saint Joseph's Lead.													
Savage, Ne.													
Sierra Grande, N. M.	.93		91		1.10						90		340
Sierra Nevada, Ne.			3.25						3.35		3.25		320
Silver King, Ar.					7.00								100
Spring Valley, Ca.													
Standard, Ca.			6.50		6.25				6 50	6.38	6.38		305
Stormont, Ut.							.10						1,000
Tip Top, Ar.													
Tombstone, Ar.													
Vizina, Ar.													
Yellow Jacket													

NON-DIVIDEND-PAYING MINES.

NAME AND LOCATION OF COMPANY.	Nov. 17.		Nov. 19.		Nov. 20.		Nov. 21.		Nov. 22.		Nov. 23.		SALES.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Albion.													
Alta-Montana													
Barcelona, G.	.22		.23		.22		.24		.25	.24	.25		6,700
Bear Creek													
Bechtel Con., G.													
Belvidere													
Best & B'licher, G. S.													
Big Pittsburg, S. L.													
Bradshaw, S.													
Buckeye													
" pref.													
Bull-Domingo, S.L.													
Bye and Bye													
Calaveras, G													
C'lav'r's W. & M. Co.													
Cal., S. H., G.	.25	.20			.25	.20							900
Central Ariz'na, S.	.18	.17			.20		.24	.20					3,925
Cherokee, G.													
Chollar													
Climax, Co.	.08	.06	.06		.08	.07	.09						8,100
Cons. Imp'ri'l, G.S.													
Cons. Pacific													
Crowell, G.													
Dahlonega, G.													
Decatur	.05		.05		.05		.05				.05		30,500
Dunderberg													
Durango, G.	.04								.03				2,300
Eastern Oregon	.45	.43	.45	.43	.44	.43	.45	.44	.45	.44	.45		14,400
Elko Cons.					.18		.19				.18		1,700
Enterprise													
Fannie Barret													
Globe Copper													
Gold Placer, G.													
Goodshaw, G.													
Granville, G.													
Hariem M. & M. Co.			.99		1.00	.99	1.00		1.00		1.10	1.00	3,200
Hortense, S.													
Imperial													
Lacrosse, G.	.10	.07	.08		.08				.07				2,250
Lucerne													
Mariposa Pref., G													
" Com., G													
Mexican, G. S.	2.65		3.00		2.75		2.80						500
Miner Boy													
Mono													
North Mexican					.60	.50	.65		.65	.60	.55	.30	2,400
North Standard, G.	.13												100
N. Horn-Silv'r, S.													
Ori'nt'l & Miller, S.					.02		.06						250
Parnell													
Rappahannock, G.													
Red Elephant, S.			.06		.06				.16				1,700
Ruby, of Arizona													
Silver Cliff, S.													
Sonora Con.	.28	.26	.27		.27	.25	.26	.25	.26	.25	.26	.25	25,100
South Bodie, G.													
South Bulwer, G.													
South Hite													
South Pacific													
State Line, 1 & 4, S.													
" Nos. 2 & 3, S.													
Sutro Tunnel	.15	.14	.16	.15	.16	.15	.15		.16		.15		7,650
Taylor Plumas													
Unadilla, S													
Union Cons., G. S.					3.70	3.60	3.50		3.10				375

Full tables giving the total amount of dividends, capital, etc., will be printed the first week of each month. Dividend shares sold, 63,688. Non-dividend shares sold, 112,050.

BOSTON MINING STOCKS.

	Nov. 16.		Nov. 17.		Nov. 19.		Nov. 20.		Nov. 21.		Nov. 22.		Sales
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Allouez													
Amie	.14						.15						300
Atlantic	11.00						10.00						40
Aztec													
Bodie Con.													
Bonanza D.	1.50						1.50				1.63		1,350
Bowman Sil	.12½	.12	.12½	.12	.16	.14	.21	.16	.19	.16	.18	.17	15,800
Bruns. Ant.													
Bulwer			.50										100
California													
Cal. & Hec.			.32		.34	.32	238	237	238		238	237¾	46
Catalpa									.38	.35	.37½		2,700
Co. Virginia													
Copper Falls													
Crescent					12½		15		.20	.15	.20		1,450
"Cusi"													
Decatur													
Deer Isle													
Denver City													
Douglas													
Duncan													
Dunkin							.27				.28		800
Elko Con													
Empire	.26	.25	.25		.27	.26	.25		.25		.25		7,150
Eureka Con.					4.00						4.00		30
Franklin							11.75		11.75				70
Gila County													
Hancock G.													
Hanshaw			.50										200
Horn-Silver	6.50												10
Huron													
Independence													
Indian Queen													
Mammoth					.02						.03		300
Mass. & N.M.									.02				2,050
Milton													
Napa													
National													
Ontario													
Osceola													
Penn-Breck													
Pewabic	3.75		3.75				3.75		3.75				75
Pine Tree													
Plymouth													
Quincy	52.00				53.00	52.00					52.00		42
Ridge													
Robinson					.42								100
San Pedro													
S'ra Grande													
Silver Isles													
Silver King													
Simpson Gd													
Sonora Con					.28				.27				300
South Paci.													
Standard													
Sullivan	.94		.94		.94		.93		.94	.93	.92	.87½	1,300
Sutro Tun.							.16		.16				400
Sycamore													
Twin Lead.													
Vizina													

PHILADELPHIA MINING STOCKS.

	Nov. 16.		Nov. 17.		Nov. 19.		Nov. 20.		Nov. 21.		Nov. 22.		Sales.
	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	H.	L.	
Amer. Cons.													
Argent	.22		.23		.21		.20	.19			.18	.16	11,400
Arizona So.													
Battle Mt.													
Buena													
California													
Calista													
Chrysolite													
Cincinnati	.10												1,000
Comprom'e	.17		.18		.17		.19		.20		.23		2,434
Contention													
Con. Virg.													
Dauntless													
Del Monte													
Denver City			.15		.13	.11	.14	.12	.13		.15		37,300
Eureka													
Girard													
Governor													
Grand Un'n													
Green Mt.													
Gunnison													
Homestake													
Horn Silver													
Iowa Gulch	.03								.03				14,200
Iron Silver													
King Bul'on													
Ledger Con.													
Little Dia'd.													
Little Maud													
Little Pitts.													
L'g & D'y H													
Montana													
Mt. Sheridan													
Navajo													
North'n B'l.													
Orion													
Orion Pref.													
Palmetto E.													
Pembina									.11				1,000
Penn-Breck			.06		.05		.06		.06	.04	.05		10,500
Permanent													
Pizarro													
Pizarro Ex.													
Potosi													
Rara Avis	.08		.09		.09		.09		.09				1,800
Rara Avis E.	.07		.07		.07						.07		5,900
Record													
Rico Pion'r													
Sierra Apac.							.20	.19					1,500
Sierra Bella			.60				.57½	.55					1,100
Sierra G'nde	.92½				.92½		1.05	.90	.90		.87½		6,300
Sierra Nev.													
Silver Cord			1.02½		1.05		1.05	1.02½	1.02¾	1.0			2,700
Silver King													
Silv'r Plume													
Sonora Con.													
Standard													
Sultana													
Sutro Tun'l													
Tombstone			.75						.75		.77½		950
Victor													
Yale Mt.													

mented by one or two other suspensions which are rumored in the West. Large buyers are holding back orders in view of a further reduction in prices, which, it is thought, will follow the 10 per cent reduction in wages which has been announced in two mills, and will go into effect in all others.

Old Rails.—A few thousand tons of old rails have been ordered in 500 to 1000-ton lots, mainly American, at $23@$23.25.

Scrap-Iron.—There is a fair demand at $24@$24 50 for No. 1, and $18@$21 for No. 2.

Pittsburg. November 21.

Our leading manufacturers have been talking this week more gloomily than at any time for a year past. They have been interviewed frequently and have expressed themselves without reserve. They are of the same make, cast in the same mold. Demand is irregular, prices low. There is no inducement to continue production; consumers are holding off. Gray Forge is selling slowly at $17@$18. Very little Foundry is moving, and that at inside figures. An occasional lot of Bessemer is called for at $21, four months. Muck Bars are without any activity at $32. A restriction in the output of bar iron has been made. Several mills have come to single turn. A good many puddling-furnaces have been laid off. There is no remedy for the present state of things, excepting a heavy restriction of production. Much demand, however, is held back, which would be presented if the trade were settled. Merchant Bar is selling at from 1·75c. up. Nails, $2.50@$2.60. The five weeks' suspension will help to steady prices for a time; for the fact that producing capacity is far ahead of requirements is likely to prevent any great activity for a long time to come. Wrought pipes are 75 per cent off list. Old rails are wanted in large lots, but buyers' views are 50c.@$1 below those of sellers. Steel rail mills are well supplied with business to the last of the year, and have a few good orders for delivery next year at $35. There are numerous offers at $34@$34.50, which have not been accepted.

The window-glass strike is still unsettled. Manufacturers are resolved to fight the strike, and are importing glass to supply customers' requirements.

The oil trade is manipulated by the Standard Company, and an upward tendency is the result, but it is thought that this will result in a drop.

COAL TRADE REVIEW.

NEW YORK, Friday Evening, Nov. 23.

Anthracite.

The market for anthracite is getting into an uncomfortable shape, as some of the sizes, which until now have done fairly well, like stove, are beginning to exhibit the signs of weakness that are the result of accumulation, and the market is more now than it has been in buyers' favor. It is unfortunate that the companies do not appear to be able to reach any understanding, and it is understood that one or two of the managers insist that their plans be carried out. The main subject of difference so far as we can trace it, is that some of the companies want to repeat the old-time dodge of three days' stoppage, which means very little in the way of restriction, because the quantity brought to market is only very slightly reduced. The only thing that can be done is to stop for a week at a time, alternate weeks, and keep it up until the supply is in good shape. An announcement of such a decision would have the effect of promptly bringing out requirements now withheld.

Bituminous.

The Cumberland coal trade held a meeting at Baltimore, at which it was unanimously decided to continue the present organization, created at the time of the labor troubles.

Vessels from the Cumberland shipping ports are in better supply. Current business is small, is closely contested for, and is often taken at low figures.

Mr. John H. Jones, official accountant, has issued the following statement of anthracite coal tonnage for the month of October, 1883. This statement includes the entire production of anthracite coal, excepting that consumed by employés, and for steam and heating purposes about the mines:

	Oct., 1883.	For year 1883.	For year 1882.	Difference.
Phila. & Reading RR.	1,328,809	8,489,686	5,626,994	I. 2,862,692
Central RR. of N. J.	*.....	1,745,399	3,485,091	D. 1,739,692
Lehigh Valley RR.	†675,243	5,225,464	4,840,589	I. 384,876
Del., Lack. & W. RR	543,515	4,218,650	3,813,712	I. 404,938
Del. & Hud. Canal Co.	‡379,478	2,910,342	2,563,220	I. 347,122
Penna. RR.	298,900	2,288,787	1,973,329	I. 315,457
Pa. Coal Co.	180,087	1,276,682	1,202,423	I. 74,259
N. Y., L. E. & W. RR	38,240	306,783	217,925	I. 88,857
Total	3,426,273	26,461,793	23,723,284	I. 2,738,509

* Included in tonnage of the Philadelphia & Reading Railroad.

† This amount includes the production of the mines of the State Line & Sullivan Railroad Company, amounting to 9275 tons.

‡ In addition, there were 61,928 tons transported from the mines by the Delaware & Hudson Canal Company, during October, which are included in tonnage of other interests.

The stock of coal on hand at tide-water shipping points October 31st, 1883, was 604,865 tons; on September 29th, 1883, 538,490 tons; increase, 66,375 tons.

Buffalo. November 19.

The all-absorbing topic of the past week was the weather which prevailed for several days here and all around the lakes. The velocity of the wind varied from 25 to 60 miles an hour. Heavy snow-storms and occasionally severe frosts diversified the situation. Ice formed on Buffalo River Thursday and Friday. Probably 100 vessels have been lost on the lakes, with property worth over $500,000. The death-roll already numbers forty persons. A newspaper writer says: "It would appear that the lakes are fringed with stranded craft, which are in a more or less critical state of wreck or threatened dissolution." Vessels ashore, waterlogged, or breaking up with valuable cargoes are reported from all points (including several of our finest and largest propellers and barges). Many vessels loaded with coal have not been heard from, and grave doubts are entertained as to their safety. In fact, the storms were the most serious of any recorded for years, and the beginnings of them were unheralded in any way—a sudden change from delightful, balmy fall weather to arctic cold and blustering gales of blinding snow.

President Sloan, of the Delaware, Lackawanna & Western Railroad, is reported to have said that he has made arrangements to establish extensive coal-yards and depots at South Chicago, on the grounds and docks of the Calumet & Chicago Coal and Dock Company. Buffalo is the point whence a line of barges will start, and the road will make its own rates without the necessity of dividing with other railroad companies. If the supply of coal laid in during the summer months should not prove sufficient to fill the demand, the Delaware, Lackawana & Western can forward all the coal it needs directly to the proposed yards during the winter by any of its Western connections.

The St. Paul & Pacific Coal and Iron Company has decided to build a large coal-dock on Connor's Point about three miles from the center of Duluth. The dock will be built solid, and have a frontage of 1000 feet, with an average depth of 290 feet; the storage capacity will be 100,000 tons of coal. The end of the new dock will be 2600 feet from the end of Rice's Point, or about midway between the center of Duluth and Superior. It is proposed to have the structure ready for business by May 1st next. The estimated expense is $50,000.

Chicago. November 17.

The Delaware, Lackawanna & Western Railroad Company is about to follow the example of the Lehigh Valley Coal Company, and establish large coal-yards and distributing depots at South Chicago. These new yards will be located on the docks and grounds of the Calumet & Chicago Coal and Dock Company, from which point the Delaware & Lackawanna has excellent facilities for handling its coal business from its western terminus at Buffalo. The company will run a line of barges from the latter point, which will admit of its making its own rates from the mines to Chicago.

Horsford's Acid Phosphate,
In Seasickness.

Prof. ADOLPH OTT, New York, says: "I used it for seasickness, during an ocean passage. In most of the cases, the violent symptoms which characterize that disease yielded, and gave way to a healthful action of the functions impaired."

ONTARIO SILVER MINING COMPANY,
Mills Building, 15 Broad Street,
NEW YORK, Nov. 19, 1883.

DIVIDEND NO. 89.

The regular monthly dividend of FIFTY CENTS per share has been declared for October, payable at the office of the transfer-agents, Lounsbery & Haggin, Mills Building, 15 Broad Street, on the 30th inst.
Transfer-books close on the 24th inst.
LOUNSBERY & HAGGIN, Transfer-Agents.

MAPS.

ARIZONA AND NEW MEXICO.—This map shows all the Township Surveys, Private Land Claims, Post-Offices, and Settlements. It also exhibits the Explorations of other Government and Private Expeditions, including the facts developed by the Surveys for the Routes of Projected Railroads, etc., 1881. Scale, one inch to thirty-three miles. Colored, 24×17 inches. Pocket form, $1.

COLORADO.—Topographical and Township Map of Part of the State, exhibiting the San Juan, Gunnison, and California Mining Regions. By Louis Nell. Substantially same as above. Post-offices, March 1st 1880. Scale, 1 inch : 9 miles, 1-570,240. Plain sheets for wall, 90 cents.

COLORADO.—Cannon's Map of the Mineral Belt of Colorado. Taken from the Records of the Surveyor-General's Office, and other reliable Official Sources. Showing, in colors, the Mineral Belt, Gold Districts, Silver Districts, Coal Districts, County Lines, and Boundaries of Land Districts. There are also given the Capital, County Seats, Township Lines, Railroads, and Projected Railroads. Scale, 1 inch : 10 miles. Size, 26×30 inches. Pocket form, $1.50; as a wall-map, $2.

SAN JUAN MINING REGION (COLO.).—Kibbe's Geographical and Geological Map of the San Juan Mining Region. 1881. Shows county lines, wagon-roads, stage routes, trails, railroads, cities and towns with post-offices, camps with post-offices, reduction-works, mountain peaks, continental divide. Also (by colors), eruptive rocks, Carboniferous, Cretaceous, Jura Trias. Elevations above sea-level. Scale, one half inch to the mile. 22 × 27 inches. Includes, on same sheet, a reduced Map of the State of Colorado. Printed in colors, with board covers. $1.50.

COLORADO.—Topographical and Township Map of the State. Compiled from U. S. Government Surveys and other authentic sources, by Louis Nell, Civil Engineer. By means of symbols, the following mass of facts is graphically shown: Railroads in operation; Railroads chartered or in progress; Wagon-roads; Wagon-roads proposed; Trails; Drainage dry during the greater part of the season; County-seats; Post-offices; Villages; Townships subdivided; Townships surveyed in outlines; Contour-lines, with vertical intervals of 1000 feet; Altitudes in feet above sea-level, by barometer observations and by spirit-levels; Private grants; Military reservations; Indian reservations ceded to the U. S. Government; Arable land, with irrigation. Tables of Areas of Counties; Astronomical Positions; Arable Land. Scale, 1 inch : 10·5 miles. Size, 31×40 inches. Pocket form. $1.50 on thick paper.

IDAHO.—The Wood River Region of Central Idaho, giving the first correct Geography of that recently explored and remarkable Belt of Discoveries of Gold and Silver Mines on the tributary streams of the WOOD and LITTLE WOOD Rivers, on the Upper Waters of the SALMON RIVER, among the SAWTOOTH MOUNTAINS, and on the Forks of the BOISE RIVER; embracing the Mount Estes and Custer Mines on the north and the Oregon Short Line Railroad on the south. Prepared by Frank J. Scott. Scale, 5 miles to the inch. Size, 15 x 26 inches. In paper pocket. Price, $1.

MEXICO.—Map of Mexico. Showing Railroads, Broad Gauge and Narrow-Gauge, Constructed; and Railroads, Broad-Gauge and Narrow-Gauge, Proposed. This very large and finely-engraved Map, constructed originally by the government for official purposes, contains all the information obtainable by it, and shows minutely the towns and villages of the entire country. Scale: 26·6 Mexican Leagues to the degree, and 69·16 English Miles to the degree: also, Kilometrical Scale. 1881. Size, 53×41 inches. Printed in colors. Pocket form, $5.

MAP OF MINING CLAIMS ADJOINING LEADVILLE, California Mining District, Lake County, Colo. By Edward Rollandet. 1879. Mounted on muslin, $2.50. In cloth-bound covers. $2.

MINING MAP OF UTAH.—Showing the location of the Mining Districts, over an extent of territory 150 miles from North to South. Compiled from U. S. Government Surveys and other authentic sources. Scale, one inch to four miles. Colored. 1879. Pocket form. $1.50.

NEW SECTIONAL AND MINERAL MAP OF UTAH.—Pocket form. Compiled from the latest U. S. Government Surveys and other authentic sources, exhibiting the Sections, Fractional Sections, Counties, Cities, Towns, Settlements, MINING DISTRICTS, Railroads, and other internal improvements. Scale, one inch to eight miles. Colored, 1878. $3.50.

POCKET MINING ATLAS OF THE MINES OF THE UNITED STATES.—Showing the Mines of NEVADA: the Comstock Lode, the Eureka, Treasure Hill, and Tuscarora Districts; CALIFORNIA, including Map of the Bodie District; COLORADO, including the Leadville, Silver Cliff, San Juan, Caribou, and Central City Districts; DAKOTA, including Map of Deadwood; MONTANA, IDAHO, UTAH, ARIZONA, NEW MEXICO, LAKE SUPERIOR REGION, the SOUTHERN STATES. 1880. Printed in colors, and bound in flexible leather covers. Price, $1.

SAN JUAN MINING REGION (COLO.).—Stockder's Map of San Juan Mining Region, compiled from U. S. Surveys and other Authentic Sources. 1881. Shows county boundaries, district boundaries, wagon-roads, trails over mountain passes from river basin to river basin, continental divide, timber-line (11,000 to 11,500 feet above sea-level), etc. Scale, 1 inch to the mile, or 1 = 63,360. 28 × 38 inches. Pocket form, stiff paper cover, $1.50; or as a wall map, $1.50.

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